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TRANS-

TRANSACTIONS

OF

THE LINNEAN SOCIETY.

I. *On the Malayan Species of Melastoma. By William Jack, M.D. Communicated by Robert Brown, Esq. F.R.S. and L.S.*

Read April 16, 1822.

THE East Indian species of *Melastoma* have been little investigated in their native soil; and the few that are mentioned in botanical works have for the most part been so imperfectly described as to occasion much confusion. This splendid genus has now become so extensive as to require being subdivided; but to do this with due regard to the natural series, and to the relative importance of the characters, would demand a critical examination of the whole, and ampler means of reference than are accessible in India. I shall therefore confine myself to such observations as have been suggested by the Malayan species which I have had an opportunity of examining. The whole of these have baccate fruit, and are therefore true *Melastomæ*, as that genus is at present constituted. They vary much in the number of their stamina, but that number is constant in each species. They all agree in having the ovula attached to placentæ, which project from the inner angle of the cells; in the

number of the cells corresponding with the divisions of the flower; in the peculiar inflexion of the anthers before expansion; and in having polyspermous berries. The points of difference to be principally attended to are the following: the similarity or dissimilarity of the alternate anthers; the number of the stamina; the anthers being with or without beaks, straight or arcuate; the calyces being hispid or nearly smooth, and having deciduous or persistent segments; the ovary being partially or completely adnate to the calyx. Of these characters, the only one which appears to me to point to a natural division of the species is that of the equality or inequality of the stamina, occasioned by the anthers being alternately pedicellate and sessile on the filaments, as in *Melastoma Malabathrica*, or being all sessile, as in *M. exigua* and others here described. Those of the first division, with unequal stamina, have generally large and beautiful flowers, hispid calyces, with frequently deciduous segments, stamina always double the number of petals, which are either five or four, and arcuate rostrate anthers which, before the expansion of the flower, have their beaks lodged in cells betwixt the calyx and ovary. Those of the second division, with equal stamina, have seldom such conspicuous flowers, have smoother calyces, with segments generally persistent, eight stamina, rarely or never ten, and occasionally only four; anthers sometimes neither arcuate nor rostrate, and their points in that case do not reach before expansion below the summit of the ovary, which is then completely adnate to the calyx. The genus *Maieta* of Ventenat has been founded upon this latter character alone; but it is obviously insufficient for a generic distinction, as it can only be considered secondary to that of the relative length of the anthers, on which depends the complete or partial adhesion of the calyx and ovary: and a little attention to the relations of the different species to each other will show, that a division

division founded on this latter character could not be established without great violence to their natural affinities. The following species are arranged according to the division now suggested.

* Antheris alternis dissimilibus. (MELASTOMA).

1. MELASTOMA OBVOLUTA. *W. J.*

M. decandra, foliis ovatis quinquenerviis appresso-pilosis, floribus 3—5 terminalibus, bracteis magnis, calycibus squamosis, laciniis ovatis deciduis.

At Tappanooly on the West Coast of Sumatra.

A small branched shrub. *Branchlets* somewhat four-angled, covered with short reddish appressed scales. *Leaves* opposite, petiolate, ovate or elliptic-ovate, five-nerved, pilose, the hairs on the upper surface shorter than those on the lower; these hairs are appressed, and lie in different directions according to the course of the nerves, like the grained fur of animals. The two opposite leaves are often unequal in size. *Petioles* scaly. *Flowers* terminal, three, rarely five, on very short pedicels, each embraced by two large broad-ovate bracts, which completely invest the calyx. These bracts are covered externally with appressed scales, but are smooth towards the margin; they do not fall off till after inflorescence. *Calyx* ovate, covered with long appressed glossy scales; limb divided into five ovate, mucronate, obliquely rotate, deciduous segments, which are membranaceous at the edges. *Corolla* large, purple, five-petalled. *Stamina* ten; *anthers* arcuate, beaked, the alternate five pedicellate, with two processes at the base. *Ovary* connected by ten partitions with the calyx. *Style* declinate. *Berry* five-celled, many-seeded.

OBS. The flat bristles or scales of the calyx are remarkably long in this species; its limb, after the fall of the segments, is acutely five-angled, and the scales that rise from these angles are so long as almost to appear like lesser laciniæ alternating with the true ones.

2. MELASTOMA MALABATHRICA. *Linn.*

TAB. I. Fig. 1. *a*—*g*.

M. decandra, foliis elliptico-lanceolatis quinquenerviis scabris, pilis brevibus appressis, floribus 7—11 opposite corymbosis, bracteis ovatis deciduis calyce minoribus, calycibus squamosis, laciniis deciduis.

Kadali. *Rheed Malab.* iv. *p.* 87. *t.* 42.

Fragarius niger. *Rumph. Amb.* iv. *p.* 137. *t.* 72.

Sikadudu. *Malay.*

Abundant throughout Sumatra and the Malay islands, and chiefly occupying open waste lands or coppices.

In giving the above character of this well known species, I have been obliged to add to the usual specific phrase, in order to distinguish it from the preceding, to which it has so much resemblance that they might easily be confounded together. The leaves of this are longer and less hairy, and the scales of the calyx are much shorter and more appressed than in *M. obvoluta*. The principal distinction however is in the inflorescence, the flowers in this being numerous, generally from seven to eleven, in a kind of corymbose panicle, and the bracts small; while in the preceding the number of the flowers seldom exceeds three, and each is invested by two large bracts, which entirely inclose the calyx, and do not fall off till the petals are fallen. The two following species have also considerable resemblance to the present,

sent, but are readily distinguished on inspection by having their calyces covered with erect bristles in place of flat scales.

This species (as well as all the rest) has the ovula attached to placentæ projecting from the inner angle of the cells: as the fruit ripens the cells become filled with pulp, and the placentæ consequently less distinct; this probably occasioned Gærtner to fall into an error in ascribing to *Melastoma* nidulant seeds, and establishing on this a distinction between it and *Osbeckia*.

3. MELASTOMA ERECTA. *W. J.*

M. decandra, foliis quinquenerviis ovatis utrinque acutis villosis, floribus 5—7 terminalibus corymbosis, calycibus scabris pilis longis erectis, laciniis linearibus deciduis.

Found at Tappanooly in Sumatra.

A small erect shrub. *Branches* round or obscurely four-sided, ferruginous, rough with erect hairs. *Leaves* opposite, petiolate, ovate, acute at both ends, four or five inches long, five-nerved, with an additional marginal line, edges recurved and denticulate, softly tomentose or pilose above, villous beneath, with strong erect hairs. *Petioles* nearly half an inch long, pilose. *Flowers* terminal, somewhat corymbose, pedicellate, generally from five to seven, large. *Bracts* small. *Calyx* ovate, beset with strong erect bristly hairs; *limb* divided into five long, linear, acute, deciduous segments. *Corolla* purplish-red, five-petalled; *petals* large, spreading. *Stamina* ten; *anthers* arcuate, beaked, the alternate ones pedicellate. *Style* declinate. *Berry* pilose, ovate, five-celled, many-seeded.

4. MELASTOMA

4. MELASTOMA DECEMFIDA. *Roxb.*

M. decandra, floribus subsolitariis terminalibus, foliis quinquenerviis, calyce decemfido setis mollibus porrectis echinato.
Roxb. Cat. Hort. Beng. p. 90.
Native of Pulo Penang.

A large shrub. *Branches* round, beset with scattered strigose scales. *Leaves* opposite, petiolate, ovate-lanceolate, acute and attenuated to the point, nearly entire, sometimes spinulose on the margin, five-nerved, with some scattered appressed hairs on both surfaces. *Petioles*, as well as the nerves of the under surface, covered with appressed strigæ, channelled above, and ciliate with long hairs along the margins. *Flowers* very large, nearly solitary, terminal, short-peduncled. *Calyx* ovate, densely covered, as well as the peduncle, with long erect soft spine-like bristles, ten-cleft: *laciniæ* long, subulate, the alternate ones shorter. *Petals* five, large, red, spreading. *Stamina* ten, arcuate, rostrate; five larger, with pedicellate anthers, appendiculate at the base. They are lodged in the cells between the calyx and ovary before expansion, as in other species. *Style* filiform. *Fruit* five-celled, many-seeded.

OBS. This species has considerable resemblance to the *M. Malabathrica*, but has larger finer flowers.

5. MELASTOMA STELLULATA. *W. J.*

M. octandra, pedunculis axillaribus 1—5-floris, calycibus setosis, setis erectis spinescentibus apice stellato-multifidis, foliis oblongo-ovatis trinerviis subtus tomentosis.
Daduruh Akkar. *Malay.*
West Coast of Sumatra.

A shrub

A shrub with long slender tomentose branches. *Pubescence* stellate. *Leaves* opposite, petiolate, oblong-ovate, elongated to the point and acuminate, rounded or cordate at the base, three or four inches long, three-nerved, entire, smooth above, ferruginously tomentose beneath. *Petioles* short, ferruginous. *Peduncles* axillary, three- sometimes one-flowered, and more rarely paniculately five-flowered. *Pedicels* long, four-sided, tomentose, thickened at the joints and below the flowers. *Bracts* leaf-like, at the divisions of the peduncle, opposite. *Calyx* oblong, somewhat tubular, tomentose, and furnished besides with long erect spinous bristles, with stellate points; *i. e.* whose points are armed with a radiated fascicle of diverging setæ; *limb* four-parted; *segments* oblong, ciliate. *Corolla* four-petalled, spreading; *petals* somewhat acute. *Stamina* eight, unequal; four long, with pedicellate anthers and filaments furnished with a fascicle of hairs at the apex; four short, with sessile anthers and bisetous filaments; all the anthers arcuate, and opening by pores at the top. *Ovary* oblong, in the bottom of the calyx, and attached to it by eight septa forming an equal number of cells, in which the points of the anthers are lodged before the expansion of the flower, four-celled, polysporous; *ovula* attached to central placentæ. *Style* declinate, thickened at the base, as long as the stamina. *Berry* contained in the persistent calyx, to which it becomes adnate, ovate, four-celled, many-seeded.

OBS. The peculiarity of the bristles of the calyx having stellate points, at once distinguishes this species from all the rest. Besides these bristles the calyx is covered with a short ferruginous wool, and the segments appear to be persistent. It was sent to me from Saloomah, and is by no means a common species.

6. MELASTOMA

6. MELASTOMA NEMOROSA. *W. J.*

M. octandra, pedunculis axillaribus 1—3-floris, foliis ovato-lanceolatis quinquenerviis subtus cum calycibus, ramis, pedunculisque ferrugineo-villosis.

Banga útan. *Malay.*

Native of the Malay Islands.

A shrub with long, virgate, round, ferruginous branches. *Leaves* opposite, petiolate, ovate-lanceolate, acuminate, slightly cordate at the base, very entire, smooth and green above, hoary with ferruginous dots beneath; five-nerved, the outer pair of nerves close to the margin. The young leaves are villous on both sides; on the upper with white stellate hairs, which soon disappear, and are rubbed off with the slightest touch; below with reddish ferruginous pubescence. *Petioles* short, round, ferruginous, connected by a prominent interpetiolar line. *Stipules* none. *Peduncles* axillary, solitary, one- to three-flowered. *Calyx* inferior, subovate, closely embracing the ovary, and connected with it by eight septa, rough with ferruginous pubescence; *limb* four-parted; *laciniæ* spreading, acute. *Corolla* four-petalled, of a flesh or light rose colour, spreading; *petals* subrotund, inserted into the calyx alternately with its laciniæ. *Stamina* eight, inserted below the petals, ascending, with arcuate rostrate anthers; four are longer, have pedicellate anthers, with fimbriated appendages at the base; the shorter have sessile anthers, with two setæ or bristles at the base. Before expansion the anthers are incurved, and have their apices inserted into the cells formed between the calyx and ovarium. *Style* ascending, as long as the short stamina. *Stigma* simple, recurved. *Fruit* within the calyx, and adhering to it by the above-mentioned septa, four-celled, many-seeded.

OBS.

OBS. This is a very beautiful large flowered species, and is a great ornament to the thickets which it frequents. I have met with it in various places, as on Sumatra, Pulo Nias, &c.

7. MELASTOMA BRACTEATA. *W. J.*

M. octandra, floribus paniculatis terminalibus, bracteis magnis ovatis, foliis cordato-ovatis quinquenerviis, calyce stellulato piloso, limbo subintegro.

Oosa. *Malay.*

Native of Pulo Penang.

The whole shrub with the exception of the upper surface of the mature leaves is covered with ferruginous points or dots of stellate hairs. *Branches* round. *Leaves* opposite, short-petioled, ovate, acuminate, cordate at the base, entire, smooth above, pilose with stellate hairs beneath, five-nerved. *Panicles* long, terminal, with opposite ramifications. *Bracts* large, pale, and membranaceous, ovate, obtuse, attenuated to the base, as if petiolate. *Calyx* oblong, greenish, adhering to the ovarium by eight septa, limb almost entire, with four obscure toothlets. *Corolla* of a pale rose-colour, four-petalled, spreading, petals ovate, obtuse, and as if truncate. *Stamina* eight, filaments red, furnished with two bristles at the insertion of the authers. *Anthers* arcuate, rostrate; four are red, and rather longer than the other four which are yellow and more incurved. *Style* declinate, as long as the stamina. *Stigma* simple. *Fruit* inclosed in the calyx, four-celled, many-seeded.

OBS. The large bracts which envelop the young flowers distinguish this species; the flowers are not large, but their number compensates for it.

** Antheris omnibus consimilibus. (STOMANDRA).

8. MELASTOMA EXIGUA. *W.J.*

TAB. I. fig. 2. *a—f.*

M. octandra, paniculis terminalibus, foliis longe petiolatis ovatis acuminatis glabris quinquenerviis, calyce quadridentato.

Native of Pulo Penang.

An erect branched shrub, with brownish bark and four-sided branches, sparingly sprinkled with rusty down. *Leaves* large, opposite, long-petioled, ovate, acuminate, acute at the base, almost entire, smooth, five-nerved, with strong transverse reticulated veins. *Petioles* long, channelled above, smooth. *Stipules* none. *Panicles* terminal, erect, small, with opposite divaricate ramifications. *Flowers* small and inconspicuous. *Calyx* inferior, tubular, connected with the base of the ovary by eight septa; limb erect, four-toothed. *Petals* four, small, white with a tinge of red, ovate, acute. *Stamina* eight, nearly erect, the alternate ones a little shorter. *Anthers* purple, erect, linear, acute, emarginate at the base (neither curved, rostrate, nor appendiculate). *Style* ascending, as long as the stamina. *Stigma* simple. *Fruit* small, dry, ovate-oblong, four-celled, many-seeded; the placentæ from the axis.

OBS. This species is remarkable by its very small flowers disposed in a divaricate open panicle, and the comparatively large size of its leaves. The fruit might perhaps properly be considered a capsule, as it appears to be destitute of pulp. The gradations from a berry to a capsule in this family are such, that it is difficult to draw the line of distinction; and it seems questionable, whether this difference, when unsupported by other characters, can be considered of generic value.

9. MELA-

9. MELASTOMA ROTUNDIFOLIA. *W. J.*

M. octandra, foliis maximis subrotundis septemnerviis, floribus capitatis involucratis.

Segoonil. *Malay.*

Found in the Musi Country, in the interior of Sumatra.

A shrub. *Leaves* opposite, long-petioled, subrotund, with a sharp acumen at the point, sometimes cordate at the base, about nine inches long, entire, seven-nerved, with a less distinct additional pair near the margin, the middle ones combined a little above the base, nearly smooth, dotted with ferruginous points, particularly on the under surface and on the nerves, deep green above, pale tinged with red beneath. *Petioles* from five to eight inches long, channelled above and ciliate with long soft hairs. *Peduncles* axillary, solitary, shorter than the petioles, supporting a dense head of involucred flowers. *Flowers* numerous, pedicelled, collected into a roundish head. *Involucre*, of five or six large, cordate, broad, many-nerved, ciliate, purple leaves embracing the flowers. *Calyx* tubular, nearly smooth, dotted; limb quadrifid. *Corolla* purple, four-petalled. *Stamina* eight, equal. *Anthers* arcuate, beaked, inappendiculate, having their points inflexed before expansion. *Ovary* connected by septa to the bottom of the calyx, four-celled, polysporous, with central placentæ. *Style* long. *Berry* four-celled, many-seeded.

OBS. This is a very singular and well marked species, distinguished from all the others of the genus by its large subrotund leaves, and by the peculiarity of having the flowers in a crowded head surrounded by a large involucre. In this particular it deviates widely from the usual habit of the

Melastomæ. It is rarely met with, and has only been obtained by me from Musi, a district lying immediately inland of Bencoolen.

10. MELASTOMA PALLIDA. *W. J.*

M. octandra, floribus paniculatis axillaribus et terminalibus, foliis ovatis quinquenerviis glabriusculis, antheris supra basin affixis.

Native of the Malay Islands.

A shrub with round branches powdered as it were with small dots. *Leaves* opposite, petiolate, ovate, subcordate, acuminate, four or five inches long, five-nerved, entire, smooth above, sprinkled with small dots beneath. *Petioles* short. *Flowers* oppositely panicled, axillary and terminal, white. *Bracts* small, acute. *Calyx* nearly smooth, four-sided, limb obscurely four-lobed. *Corolla* four-petalled, petals oblong, obtuse. *Stamina* eight, equal; filaments with two bristles at the top; anthers curved, beaked, opening by a pore, attached to the filaments a little above the base on the inside, and before expansion turned downwards so as to have their faces closely applied to the filaments. *Ovary* connected to the calyx by eight septa or partitions, four-celled, polysporous. *Style* nearly as long as the stamina. *Berry* four-celled, many-seeded.

OBS. The insertion of the filaments is here somewhat different from what is usual in this genus, being, as it were, articulate a little above the base of the anther, and there forming a hinge on which the anther moves. This structure becomes still more singular in the following species, where the filament is inserted nearly as high as the middle of the anther, and is adnate to it from thence as far as the base, being thus

thus recurved upon itself when the anther comes into the erect position. The two species are nearly related, being principally distinguished by the number of the stamina, which are only four in the latter.

11. MELASTOMA FALLAX. *W. J.*

M. tetrandra, paniculis terminalibus, foliis ovatis quinquenerviis subtus tomentosis, antheris erectis infra medium affixis.

Native of Sumatra.

A shrub with long rather compressed tomentose branches. *Leaves* opposite, petiolate, ovate, cordate at the base, acuminate, four or five inches long, entire, five-nerved, smooth above, tomentose and ferruginous beneath. *Petioles* about half an inch in length. *Panicles* terminal, erect, many-flowered; divisions opposite. *Bracts* small, acute, at the base of the flowers, opposite. *Calyx* adnate to the ovary, four-sided, contracted at the mouth; limb spreading, almost entire, four-cornered. *Corolla* white, four-petalled; petals subrotund, inserted on the calyx. *Stamina* four, filaments erect, expanded into a membrane at the summit, which is adnate to the anther from near their middle to their base; anthers thick, corrugated, nearly straight, without appendices at the base, beaked, opening by a pore at top, attached by their anterior faces to the filaments a little below the middle. Before flowering the anthers are doubled downwards upon the filaments, so as to have the appearance of being pendulous; by the extrication of their beaks, however, the upper part of the filament is reflexed, and the point of insertion, which before expansion was posterior, becomes anterior. *Ovary* adnate to the calyx without connecting septa or cells, the beaks of the anthers not reaching

so low; four-celled, polysporous, placentæ from the inner angles. *Style* erect, as long as the stamina. *Berry* ovate, four-celled, many-seeded.

OBS. Besides being tetrandrous, this species is remarkable for the unusual mode of attachment of the anthers to the filaments, of which a partial example is afforded in the preceding. There is a strong resemblance between the two in habit as well as in this particular. Here we have the ovary completely adnate to the calyx, while in the preceding the anthers reach lower down, and are therefore lodged in cells betwixt them; but the two species are too nearly related in all other respects to admit of being separated on this account.

12. MELASTOMA GRACILIS. *W. J.*

M. octandra, staminibus alternis nanis, paniculis terminalibus gracilibus, foliis ovatis acuminatis glabris trinerviis, ramis compressis.

Sedudu akar. *Malay.*

Sumatra.

A shrub. *Branches* compressed, nearly smooth. *Leaves* opposite, petiolate, ovate or lanceolate-ovate, rounded at the base, very acuminate, four inches long, smooth, dotted with minute tubercles above, three-nerved, with a less distinct marginal pair, the transverse veins conspicuous. *Petioles* short, slender. *Panicle* terminal, oppositely branched, peduncles and pedicels slender, thickened at their joints. *Bracts* linear. *Calyx* ovate, smooth; limb absolutely four-lobed, persistent. *Corolla* blueish-white, four-petalled. *Stamina* eight, the alternate ones considerably smaller; anthers nearly straight, without beaks, furnished at the base with two

two long linear flat appendices or awns; their points before expansion only reaching to the top of the ovary. *Ovary* adnate to the calyx, four-celled, polyspermous; placentæ from the inner angles. *Style* simple, erect. *Berry* globose, smooth, rather dry, four-celled, many-seeded.

OBS. This is a slender, delicate, small-flowered species, having considerable resemblance to the following. The alternate stamina are here very small, so as almost to appear abortive; but the form and structure of all the anthers and their appendages are precisely the same. In the first division of the *Melastomæ*, the inequality of the stamina is occasioned by the dissimilar structure of the alternate anthers; in the second, whatever difference may occur in their relative lengths, their structure is precisely alike. No ambiguity can therefore be occasioned by such an inequality as exists in this species, were even its real affinities less strongly expressed in its general habit and secondary characters.

13. MELASTOMA GLAUCA. *W. J.*

M. tetrandra, paniculis terminalibus glaucis, foliis quinquenerviis acuminatis basi cordatis glabriusculis.

Osbeckia tetrandra. *Roxb. Cat. Hort. Beng. p.* 88.

Tuniong utan. *Malay.*

Abundant at Pulo Penang.

A shrub of considerable height, with stellulate pubescence. *Branches* spreading, round, pubescent. *Leaves* opposite, short-petioled, recurved, ovate-oblong, cordate at the base, acuminate, entire, very smooth, thinly sprinkled beneath with stellulate hairs, somewhat rigid, five-nerved, with prominent transverse veins. *Petioles* short, tomentose, channelled above and ciliate on the edges, connected by an inter-

interpetiolar line. *Stipules* none. *Panicles* terminal, with opposite divaricate ramifications, glaucous throughout. *Bracts* ovate, acute, ciliate. *Calyx* oblong, smooth, glaucous, cærulescent above. *Limb* entire. *Corolla* of a delicate blue, four-petalled, spreading; *petals* ovate, acuminate. *Stamina* four fertile, ascending; *filaments* appendiculate at the apex; *anthers* long, much curved, rostrate, opening by a pore at top; besides these there are two abortive filaments. *Ovary* connected to the calyx by four septa, between which the beaks of the anthers are lodged before expansion, four-celled, polysporous; *placentæ* from the inner angles of the cells. *Style* reddish, longer than the stamina. *Stigma* simple. *Berry* of a fine glaucous-purple colour, ovate, four-celled, many-seeded.

Obs. This is a handsome shrub, easily distinguished by the glaucous tint of its panicles, and in general appearance has considerable resemblance to the preceding. Only four stamina are here fertile, but they are accompanied by two small filaments without anthers. The leaves are of a deep green, rather rigid, with strongly-marked nerves and veins. While young, both surfaces are sprinkled with stellulate pubescence, which is easily rubbed off, and disappears with age. The appendages of the stamina are in the form of rounded auricles.

14. Melastoma viminalis.

M. octandra, foliis oblongis obtuso-acuminatis basi cordatis quinquenerviis, paniculis trichotomis, bracteis oppositis oblongis ciliatis, antheris quatuor alternis sterilibus.

Native of Sumatra.

A large climbing shrub. *Branches* long and drooping, round, pubescent, tinged with purple. *Leaves* opposite, sub-bifarious,

rious, petiolate, oblong, cordate at the base, terminating in a long obtuse acumen, entire, smooth above, sprinkled with minute stellate hairs beneath, five-nerved, the outermost pair less distinct than the others; five or six inches long. *Petioles* short, generally furnished with one or two setæ on the edges immediately below the leaf. *Stipules* none; interpetiolar line prominent, naked. *Panicles* oppositely corymbose, trichotomous, terminal and axillary, the whole forming a large foliose panicle at the end of the branch. *Bracts* rather large, opposite, erect, oblong, ciliate, pubescent as well as the peduncles and calyces. *Calyx* oblong-ovate; *limb* nearly entire. *Corolla* white, four-petalled; *petals* acute, subrotate. *Stamina* eight, of which four are fertile, bearing thick, straight, yellow anthers; the alternate four are sterile, of nearly equal length, but having in place of an anther a simple filiform process, which is appendiculate at the base: both are equally incurved between the calyx and ovary before expansion. *Style* subulate, declinate. *Stigma* small. *Berry* sub-globose, purple, four-celled, many-seeded. *Seeds* attached to placentæ, which project from the inner angle of the cells.

15. MELASTOMA EXIMIA.

M. octandra, paniculis terminalibus, foliis maximis glaberrimis elliptico-ovatis quintuplinerviis.

Found on the side of Gunong Búnko, commonly called the Sugar-loaf Mountain, in the interior of Bencoolen.

This is a large shrub with irregularly four-sided branches. *Leaves* opposite, short-petioled, very large, elliptic-ovate, acute at both ends, with a short acumen at the point, entire, very smooth, thick and leathery, quintuple-nerved, fifteen

or sixteen inches long. A dense circle of brown-coloured bristles surrounds the joints of the stem within the axils. *Panicles* terminal, large, red, the subdivisions quaternate; *bracts* similarly quaternate and verticillate, ovate. *Flowers* pale flesh-coloured. *Calyx* oblong; *limb* obsoletely four-toothed. *Petals* four. *Stamina* eight, nearly equal; *anthers* similar and equal, purple, furnished with two short yellow appendages at the base. *Ovary* connected with the calyx by eight septa. *Style* simple. *Berries* reddish-purple, four-celled, many-seeded.

OBS. This is a very remarkable and splendid species, with uncommonly large deep-green leaves, and highly coloured panicles.

16. MELASTOMA RUBICUNDA. *W. J.*

M. octandra, floribus axillaribus dichotome cymosis rubescenti-pellucidis, calycis margine integro, foliis oblongo-ovatis triplinerviis glaberrimis.

Native of the forests of Singapore.

A shrub with long branches and cinereous warted bark. *Leaves* opposite, short-petioled, oblong, ovate, acuminate, obtuse at the base, triple-nerved, very entire, very smooth, pale green and punctate beneath. *Petioles* short, thick. *Cymes* somewhat paniculate, axillary, dichotomous, divaricate; *peduncles* and *pedicels* smooth and red. *Calyx* semi-inferior, sub-globose, somewhat pellucid, and of a delicate red, fleshy, smooth, attached to the ovary by eight partitions; margin entire and incumbent. *Corolla* white, almost diaphanous, four-petalled; *petals* oblong, reflexed. *Stamina* eight, erect. *Anthers* long, curved, beaked, bituberculate at the base, red, before expansion having their points lodged in the cells betwixt

betwixt the calyx and ovary. *Style* as long as the stamina. *Stigma* simple. *Berry* rubescent, four-celled, many-seeded.

17. MELASTOMA PULVERULENTA. *W. J.*

M. octandra, floribus terminalibus corymboso-paniculatis rubicundis pulverulentis, foliis ovatis basi bituberculatis glaberrimis trinerviis.

Sibiring. *Malay.*

Found, along with the preceding, at Singapore, and in many parts of Sumatra and the islands which skirt its western coast.

A shrub with smooth brown bark, and furfuraceous branches. *Leaves* opposite, petioled, ovate, obtuse, bituberculate at the base, very entire, very smooth, three-nerved, veins not prominent, coriaceous, paler beneath. *Stipules* none. *Petioles* short, round, furfuraceous. *Panicles* terminal, oppositely corymbose: *peduncles* dichotomous, reddish and papillous. *Calyx* sub-globose, obscurely four-angled, surrounding the ovary, rubescent, pulverulent; *limb* four-lobed. *Corolla* four-petalled, red, sprinkled with yellow powder; *petals* spreading, lanceolato-ovate, with a small toothlet on each side. *Stamina* eight, erect; *anthers* long, red, with white cells, opening by a pore at the top, straight, furnished behind the base with a fascicle of white hairs; before expansion incurved like the other *Melastomæ*, but being without beaks, not reaching beyond the top of the ovary. *Ovary* adnate to the calyx, four-celled, many-seeded; *placentæ* from the inner angle of the cells. *Style* declinate, as long as the stamina. *Stigma* obtuse. *Berry* sub-globose, four-celled, many-seeded.

OBS. These two Singapore species are nearly related to each

other, and differ considerably in habit from the other *Melastomæ* chiefly in their extreme smoothness and the greater delicacy of their flowers. The latter is by far the most frequent, and appears to prefer the neighbourhood of the sea. The tubercles of the leaf are formed by the incurving of its base upon the petiole at the point of junction: they are rarely exactly opposite, but generally higher on the one side than the other. The petals have a kind of appendix or toothlet on the margin, a little above the middle. In the former species the petals are singularly transparent and delicate.

18. MELASTOMA ALPESTRIS.

TAB. I. Fig. 3. *a—d.*

M. decandra, paniculis terminalibus, foliis sessilibus glaberrimis crenulatis quintuplinerviis.

Found on the summit of the Sugar-loaf Mountain (Gunong Búnko) in Sumatra.

A small shrub, with smooth sub-dichotomous branches. *Leaves* opposite, sessile, semi-amplexicaul, ovate, elongated upwards, obsoletely crenate, very smooth, coriaceous, pale green, with a purplish shade beneath, quintuple-nerved; three to four inches long. A circle of short brown threads in the axils. *Panicles* terminal, divaricate, flesh-coloured. *Bracts* small. *Calyx* five-dentate. *Corolla* five-petalled, of a delicate flesh-colour, rotate; *petals* obtusely notched at the point. *Stamina* ten, ascending, equal. *Anthers* similar and equal, curved, beaked, dark-purple, having a toothlet or spur behind; before expansion their points reach about half way down between the calyx and ovary. *Style* simple. *Berries* red, five-celled, many-seeded.

OBS. This is the first decandrous species I have met with belonging

ing to the second division of *Melastomæ* with similar anthers. In habit and in the texture of the leaves it has a close resemblance to *M. pulverulenta*, but its flowers have more resemblance to those of *M. rubicunda;* it must be associated with these two. From the characters of this species, it appears that neither the number of the stamina, nor of the nerves of the leaves, afford subdivisions consonant to the natural series. I met with this plant on the very summit of the Sugar-loaf, along with *Rhododendra* and *Vaccinia*.

EXPLANATION OF THE FIGURES IN TAB. I.

Fig. 1. *Melastoma Malabathrica.*

a. The calyx.
b. The flower.
c. The same laid open, to show the stamina.
d. A longitudinal section of the unexpanded flower, showing the manner in which the anthers are lodged in cells between the calyx and ovary.
e. A transverse section of the same, showing the septa by which the calyx is connected with the ovary.
f. The fruit.
g. A transverse section of the same.
All of the natural size.

Fig. 2. *Melastoma exigua.*

a. The calyx.
b. The flower.
c. The same cut open, to show the stamina.
d. Two stamina magnified.
e. The fruit.
f. A transverse section of the same.

Fig.

Fig. 3. *Melastoma alpestris.*

a. The flower.

b. The same cut open, showing the stamina.

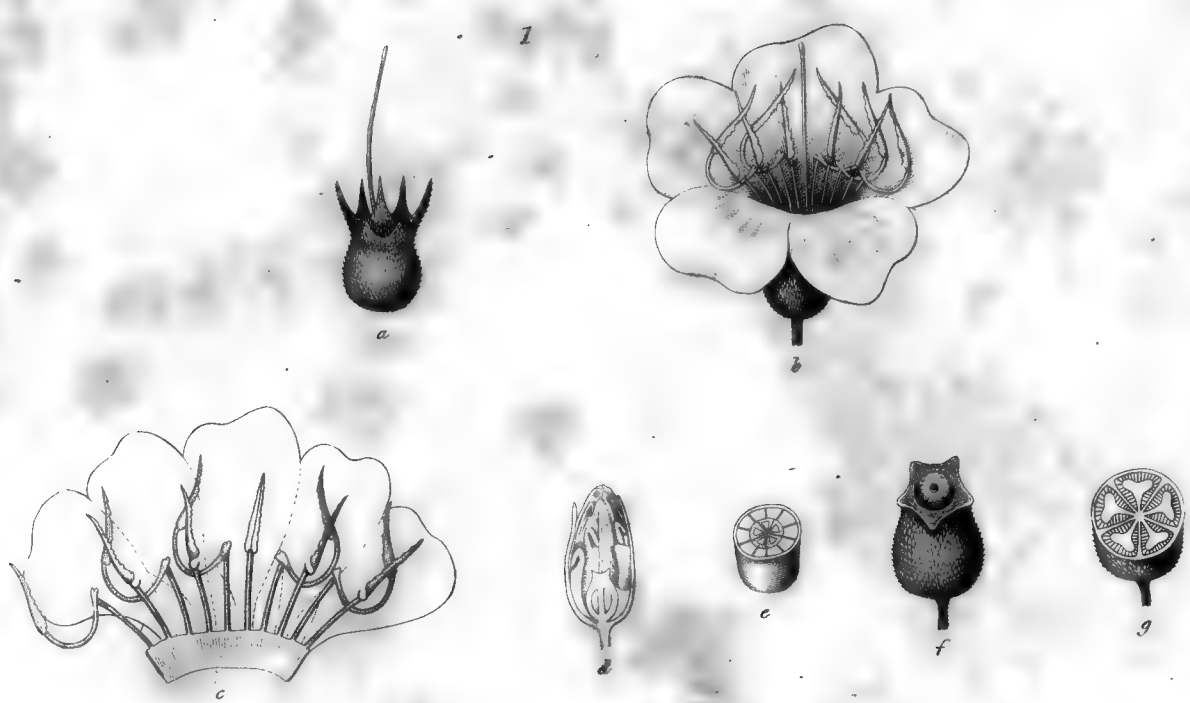
c. The fruit.

d. A transverse section of the same.

All of the natural size.

Trans. Linn. Soc Vol. XIV Tab I p. 22.

1



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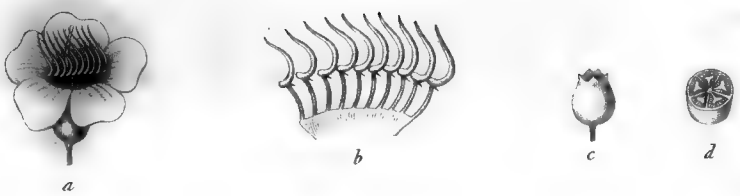


J. Curtis sculp.

II. *On Cyrtandraceæ, a new Natural Order of Plants. By William Jack, M.D. Communicated by Aylmer Bourke Lambert, Esq. F.R.S. V.P.L.S.*

Read May 7, 1822.

In examining some of the numerous Sumatran species of *Cyrtandra*, I was lately led to observe the great inaccuracy of Forster's description and figure of the fruit, which has been the cause of deception in regard to its natural affinities. His error consists in representing the septum as complete, with adnate placentæ similar to what obtains in some genera belonging to *Scrophularinæ;* whereas, in reality, it is bipartite through the axis of the fruit, and the placentæ are no other than the revolute lobes of the septa. This peculiar structure is more distinct in the nearly related genus of *Didymocarpus* (*Mal. Misc. vol.* i.), which has capsular fruit, and where the lobes of the contrary dissepiment so completely bipart the cells as to give it the appearance of being quadrilocular. It is obvious that this character is totally inconsistent with that of *Scrophularinæ*, and it does not accord exactly with any of the Jussiæan orders. *Didymocarpus* is related to *Bignoniaceæ* through *Incarvillea*, but is not admissible into that family as defined by Mr. Brown in his *Prod. Fl. Nov. Holl.* I am therefore inclined to think that *Cyrtandra*, *Didymocarpus*, and another genus, which I shall here present under the name of *Loxonia*, which agree remarkably in general habit as well as in carpological structure, may properly form a small and

and distinct family near to *Bignoniaceæ*. The two first genera are numerous in the Malay islands; and I may remark that, as far as my present observations extend, the *Cyrtandræ* appear to prevail principally to the south of the Equator, and the *Didymocarpi* on the north, where it has even been found, according to the observations of Dr. Wallich, to extend to the alpine regions of Nepal. I shall proceed to give the characters by which this family and its genera are distinguished, and shall add descriptions of all the species that I have as yet had an opportunity of examining.

CYRTANDRACEÆ.

Calyx monophyllus, divisus.

Corolla monopetala, hypogyna, sæpius irregularis, 5-loba.

Stamina. *Filamenta* 4, duo plerumque, nunc quatuor antherifera. *Antheræ* biloculares, per paria connexæ.

Ovarium disco glanduloso cinctum, biloculare vel pseudo-4-loculare, polysporum. *Stylus* simplex. *Stigma* bilamellosum v. bilobum.

Capsula v. *Bacca* bilocularis, bivalvis, polysperma. *Dissepimenta* contraria, biloba, lobis revolutis seminiferis, loculos bipartientibus (inde pseudo-4-locularis). *Semina* nuda.

Herbæ vel suffrutices. *Folia* simplicia, plerumque opposita, altero sæpe abortivo aut nano, exstipulata. *Inflorescentia* axillaris.

In this family the flowers nearly resemble those of the *Bignoniaceæ*, but have most frequently only two fertile stamina, and rarely exhibit any trace of a fifth. In fruit they are abundantly distinct; and the herbaceous stems, simple leaves, and axillary inflorescence, form important and striking differences of habit.

CYRTANDRA,

CYRTANDRA, *Forst.*

Calyx quinquepartitus. *Corolla* infundibuliformis, ad faucem ampliatus, limbo quinquelobo subirregulari, rarius bilabiato. *Stamina* quatuor, quorum duo antherifera. *Bacca* oblonga, calyce longior; dissepimenti lobis per totam superficiem seminiferis. *Semina* nuda, sæpe foveolata v. punctata.

Folia opposita, altero plerumque abortivo aut nano. Flores sæpissime capitati involucrati.

* Herbaceæ corollâ subirregulari.

1. CYRTANDRA MACROPHYLLA.

TAB. II. Fig. 1. *a—g.*

C. foliis subrotundo-ovatis serratis glabris, involucro monophyllo, pedunculis petiolo brevioribus.

Selabang. *Malay.*

Native of the interior of Sumatra.

Suberect. *Branches* thick, four-sided, with rounded angles, and two opposite sides deeply furrowed. *Leaves* apparently alternate, but in reality opposite, the petioles springing from the joints of the stem, perfect on one side, but abortive on the other, forming nothing more than a short ligula without a leaf; subrotund-ovate, acute, serrated with rounded blunt serratures, smooth on both sides, dark-green above, whitish beneath, with strongly prominent nerves: a foot in length by about nine inches broad. *Petioles* eight or nine inches long, thick, embracing the stem at the joint, and uniting with the base of the opposite petiole, which is only one or two inches long, and tapers into a point without ever expanding into a leaf. *Peduncles* opposite, from the axils both of the perfect and abortive petioles, slender, not

so long as the petiole, supporting a round dense head of flowers, which is embraced at the base by a monophyllous, three- or four-parted involucre, and by several large bracts within it. *Flowers* white, numerous, nearly sessile, aggregated into a round head. *Calyx* tubular, somewhat woolly, divided at the mouth into five linear segments, generally more deeply cloven on one side. *Corolla* infundibuliform, much longer than the calyx, expanding at the mouth; *limb* divided into five rather unequal lobes. *Stamina* two, shorter than the corolla, and inserted on its tube, joined by their anthers; the rudiments of two abortive stamina. *Anthers* of two parallel lobes, which are woolly at their base. *Ovary* embraced at the base by a nectarial ring, long, two-celled; cells bipartite by the revolute lobes of the dissepiments. *Style* as long as the stamina. *Stigma* infundibuliform. *Berry* oblong, somewhat curved, cylindrical, acuminate, two-celled, many-seeded; seeds arranged round the revolute lobes of the septa, small, roundish.

2. CYRTANDRA MACULATA.

C. foliis subrotundo-cordatis acutis serratis supra glabris, corollæ lobis tribus inferioribus maculâ purpureâ.

Sumatra.

A low herbaceous plant. *Leaves* opposite, one abortive, the other petiolate, round-cordate, acute, serrated, smooth above, somewhat villous beneath; about four inches long, by four and a half broad. *Flowers* capitate, involucred, axillary. *Calyx* tubular, five-toothed. *Corolla* much longer than the calyx, white, with a large purple spot on each of the three lower lobes; *limb* five-lobed, sub-irregular. *Stamina* two fertile, two sterile. *Style* one. *Berry* oblong, many-

many-seeded, seeds disposed round the lobes of the dissepiment.

3. Cyrtandra bicolor.

C. foliis elliptico-lanceolatis basi cordatis supra glabris, subtus villosis purpureis, pedunculis petiolo brevioribus.

Sumatra.

Stem herbaceous, sub-erect. *Leaves* opposite, long-petioled, one of the petioles generally abortive, elliptic-lanceolate, cordate and rounded at the base, acute, edges revolute, smooth and dark-green above, purple, villous, and very soft beneath; nine or ten inches long. *Petioles* about the same length as the leaves. *Peduncles* axillary, reflexed, about two inches long, bearing a head of from six to ten pedicellate flowers, embraced by a short deciduous involucre. *Calyx* tubular, quinquefid. *Corolla* white, large; *limb* sub-irregular, five-lobed. *Stamina* two, with two abortive filaments. *Style* one. *Berry* oblong, many-seeded; lobes of the dissepiments seminiferous.

4. Cyrtandra hirsuta.

C. foliis elliptico-ovatis basi cordatis crenatis utrinque pilosis, capitulis paucifloris hirsutis, involucro bipartito.

Sumatra.

Herbaceous, ascending, pilose. *Stem* round. *Leaves* opposite, one of them generally abortive, and hence apparently alternate, long-petioled, round-oval, or elliptic-ovate, cordate at the base, rather obtuse, crenate, pilose with remote erect hairs; about five inches long and three broad. *Petioles* round, as long as the leaves, embracing the stem at the joints, and uniting with the base of the opposite one, which

is generally an abortive leafless stalk of an inch in length. *Peduncles* axillary, reflexed, villous, shorter than the petioles, supporting a head of from two to five flowers, invested by an involucre composed of two opposite ovate leaflets united at the base. *Calyx* tubular, hirsute with brown hairs, quinquefid. *Corolla* white, pilose without, much longer than the calyx; *tube* curved, expanding into a large infundibular mouth; *limb* five-parted, somewhat two-lipped; *segments* nearly equal. *Stamina* two fertile, shorter than the corolla; two abortive rudiments. *Anthers* connate. *Style* about the length of the stamina. *Stigma* thick, depressed, and transverse. *Ovary* surrounded by a nectarial ring, long, two-celled; *cells* bipartite by the revolute lobes of the dissepiment, to which the seeds are attached all round.

5. CYRTANDRA GLABRA.

C. foliis lato-ovatis serratis glabris, capitulis breve-pedunculatis, involucro monophyllo.

Interior of Bencoolen.

Herbaceous. *Leaves* alternate from the abortion of the opposite petiole, rather long-petioled, broad-ovate, acuminate, rather acute at the base, serrated, smooth; about seven inches long by five broad. *Peduncles* axillary, short, supporting a head of large white flowers. *Involucre* monophyllous, closely embracing the flowers. *Calyx* five-cleft. *Corolla* much longer than the calyx, expanding into a wide funnel-shaped faux; *limb* five-parted, nearly equal. *Stamina* two, conniving, shorter than the corolla; the rudiments of two others. *Anthers* united. *Style* longer than the stamina. *Stigma* dilated, sub-bilabiate. *Berry* as in the genus.

6. CYRTANDRA

6. Cyrtandra incompta.

C. hirsuta, foliis elliptico-ovatis serratis, floribus capitatis hirsutis, involucro diphyllo.

Langkabang. *Malay.*

Native of Sumatra.

Herbaceous, erect, shaggy with brown hair. *Leaves* alternate from the abortion of the opposite leaf, of which there is sometimes a rudiment observable, long-petioled, elliptic-ovate, acute, serrated, villous; six inches long. *Petioles* about three inches long, densely villous with brown hair. *Peduncles* axillary, solitary, shorter than the petioles, bearing a small compact head of sessile flowers, the whole densely woolly. *Involucre* of two ovate, acute leaflets. *Calyx* tubular, covered with brown wool, quinquefid. *Corolla* villous without, infundibuliform; *limb* five-parted, nearly equal. *Stamina* two, conniving, joined by their anthers. *Anthers* with erect parallel lobes. *Ovary* embraced by a nectarial ring. *Style* one. *Berry* as in the genus. *Seeds* foveolate.

This plant is remarkable for the shagginess of all its parts.

7. Cyrtandra aurea.

C. foliis oppositis subrotundo-ovatis acuminatis serratis sericeo-pilosis, capitulis densis subsessilibus.

At the foot of Gunong Bunko, interior of Bencoolen.

A large strong erect species; *stem* thick, four-sided, with rounded angles, pilose with appressed hairs. *Leaves* opposite, both perfect, long-petioled, subrotund-ovate, very large, acuminate, serrate, sericeously pilose, particularly on the under surface. *Heads* axillary, sub-sessile, densely many-flowered.

flowered. *Involucre* closely investing the head, and nearly as long as the flowers. *Flowers* yellow. *Calyx* tubular, angled, nearly as long as the tube of the corolla. *Corolla* sub-campanulate; *limb* nearly equal, five-lobed. *Stamina* two, with two sterile filaments. *Style* one. *Stigma* bilabiate. *Berry* oblong, two-celled, many-seeded, as in the genus.

OBS. The yellow colour of the flowers is an unusual occurrence in this family; white is almost without exception the prevailing colour.

8. CYRTANDRA PELTATA.

C. foliis peltatis ovatis acuminatis.

Sumatra.

Stem ascending, round, smooth. *Leaves* long-petioled, the opposite petiole abortive, peltate, ovate, rounded at the base, acuminate above, obtusely serrate, smooth, paler beneath, eight or ten inches long. *Heads* axillary, very short-peduncled, involucred. *Calyx* five-cleft. *Corolla* white, infundibular; *limb* five-lobed, sub-irregular. *Stamina* two, sterile filaments two. *Ovary* embraced by a nectarial ring. *Style* one. *Berry* oblong, many-seeded, as in the genus.

9. CYRTANDRA CARNOSA.

C. foliis lanceolato-oblongis basi obliquis carnosis oppositis, altero minimo subrotundo.

Creeping or scandent, obscurely four-sided, smooth. *Leaves* opposite, unequal; the one lanceolate-oblong, oblique at the base, entire, thick, fleshy, veinless, smooth above, tomentose beneath, about seven or eight inches long; the other small, cordate, subrotund, acuminate. *Heads* axillary,

lary, short-peduncled, three- to seven-flowered. *Involucre* of two ovate acuminate leaflets. *Flowers* white, very short-pedicelled. *Calyx* short, five-toothed. *Corolla* much longer than the calyx, infundibular; *limb* five-lobed, nearly equal. *Stamina* two fertile, shorter than the corolla; *filaments* curved, broader above; two sterile; *lobes* of the anthers slightly unequal. *Style* simple. *Stigma* dilated. *Berry* two-celled, many-seeded; placentation as in the genus.

** Frutescentes, corollâ bilabiatâ.

10. CYRTANDRA FRUTESCENS.

C. erecta, foliis oppositis lanceolatis serratis glabris, pedunculis axillaribus trifloris.

Suffrutescent, erect. *Leaves* opposite, petiolate, broad-lanceolate, acuminate, serrate, smooth; seven to nine inches long. *Peduncles* axillary, generally three-flowered, not so long as the petioles. *Bracts* linear, at the base of the pedicels. *Calyx* five-parted; *segments* subulate, erect. *Corolla* purplish, bilabiate, the lower lip longer, three-lobed; *lobes* very shallow. *Stamina* two fertile, two sterile. *Stigma* dilated, sub-bilabiate. *Berry* cylindrical, longer than in the other species, two-celled; *lobes* of the septa revolute, biparting the cells, and seminiferous on their whole surface. *Seeds* naked.

OBS. This species and the following differ considerably in habit from the other *Cyrtandræ*, and have more resemblance to *Didymocarpus frutescens;* from which, however, they are distinguished by their baccate fruit, and by the insertion of the seeds upon the whole surface of the lobes of the dissepiment; while in *Didymocarpus* they are attached only to the edge. These species might perhaps be separated from *Cyrtandra*

Cyrtandra on account of their bilabiate corolla and longer fruit.

11. Cyrtandra rubiginosa.

C. erecta, foliis obovato-lanceolatis serratis, pedunculis axillaribus fasciculatis unifloris, cum calycibus viscoso-pilosis.

Frutescent, erect. *Stem* obsoletely four-angled, the young parts bristly. *Leaves* opposite, petiolate, obovate-lanceolate, acuminate, acutely serrate, smooth, the nerves pilose on the lower surface. *Peduncles* several, axillary or below the leaves, generally one-flowered, shorter than the petioles, covered with viscous hairs. *Bracts* linear, acute. *Calyx* tubular, pilose, like the peduncles, with greenish viscous hairs, five-parted; *segments* linear. *Corolla* of a dusky purplish colour, pilose without, bilabiate, the lower lip longer, divided into three small shallow lobes; upper lip bifid. *Stamina* two fertile, two sterile; *filaments* broader above. *Style* one. *Stigma* obtusely two-lipped. *Berry* cylindrical, many-seeded; placentation as in the genus.

DIDYMOCARPUS. *Wallich.*

Calyx 5-fidus. *Corolla* infundibuliformis, limbo quinquelobo, subirregulari, rarius bilabiato. *Stamina* 4, rarissime 5, quorum duo nunc quatuor antherifera. *Capsula* siliquæformis, pseudo-quadrilocularis, bivalvis, hinc dehiscens; dissepimenti contrarii lobis valvulis parallelis iis denique æmulis (ideoque fructum bicapsularem mentientibus) margine involuto seminiferis. *Semina* nuda pendula.

Folia

Folia simplicia opposita, raro alterna, æqualia, floribus axillaribus pedunculatis vel racemosis.

1. DIDYMOCARPUS CRINITA. *Malay Miscell. vol.* i.

TAB. II. Fig. 2. *a—i.*

D. erecta, foliis alternis longis spathulatis acutis serratis pilosis subtus rubris, pedunculis 2—5 axillaribus unifloris basi cum petiolis coeuntibus.

Timmu. *Malay.*

In the forests of Pulo Penang.

Root long and tapering. *Stem* short, erect, thick, rough beneath, with the vestiges of fallen leaves. The whole plant is covered with hairs. *Leaves* alternate, crowded, sub-sessile, long, spatulate, nine to ten inches in length, acute, obtuse at the base, serrated, rugose, hairy, brownish-green above, purplish-red beneath; middle nerve strong and thick, forming a short petiole at the base. *Stipules* none. *Peduncles* two to five in each axil, one-flowered, round, two inches long, uniting at the base into a short thick unilateral rachis, densely pilose, and adhering beneath to the petiole. *Bracts* linear, two, alternate on each peduncle. *Calyx* five-parted, hairy, reddish; laciniæ erect, linear, acute, the upper one smaller. *Corolla* white, tinged with purple externally, much longer than the calyx, infundibuliform; *tube* somewhat gibbous at the base, incurved, expanding above; *limb* sub-bilabiate; upper lip two-lobed; lower three-lobed, larger, internally streaked with yellow; all the segments roundish, obtuse, not very unequal. *Stamina* inserted within the tube, two fertile, with the rudiments of two abortive ones, the former scarcely so long as the corolla, conniving at their summits. *Anthers* composed of two divaricate transverse

lobes. *Ovarium* linear, surrounded at the base with a white tubular entire nectarial ring or cup, and produced into a tomentose style of the same length as the stamina. *Stigma* obtuse, truncate. *Capsule* long, linear, silique-shaped, cylindrical, acute, somewhat tomentose, one to two inches long, two-valved, two-celled; dissepiments contrary, with two lobes, which are parallel to the valves, revolute and seed-bearing at their margins, and parting the cells in such a manner as to give the appearance of a four-celled siliqua. *Seeds* numerous, naked, small, and subrotund.

Obs. The deep-red colour of the lower surface of the leaves, and the crested disposition of the flowers in their axils, render this a very remarkable species. The æstivation is imbricate, the two lateral lobes of the lower lip being the outermost.

2. Didymocarpus racemosa.

D. foliis oppositis lanceolatis utrinque attenuatis duplicato-serratis supra glabris, pedunculis axillaribus plerumque bifidis, floribus racemosis, pedicellis binatis.

At Tappanooly, on the west coast of Sumatra.

Stem short, erect, simple, rough with the vestiges of old leaves. *Leaves* crowded, opposite, sub-petiolate, spreading, about nine inches long, narrow-lanceolate, attenuated towards both ends, duplicato-serrate, strongly nerved; upper surface smooth, with the exception of the middle rib, which is furnished with long hairs; all the nerves of the under surface pilose. *Petioles* short, embracing the stem; densely pilose above. *Peduncles* axillary, generally solitary, erect, shorter than the leaves, covered with purple glandular hairs; generally dividing into two racemes, composed of many pedicellate flowers arranged in pairs. *Bracts* lanceolate, acuminate,

minate, serrate, ciliated. *Flowers* white, as in the genus. *Calyx* five-parted, erect, reddish, hairy. *Capsules* linear, straight, generally deflexed, nearly cylindrical, rough with short erect hairs, pseudo-quadrilocular. *Seeds* naked.

Obs. This species has great resemblance in general habit and in the form of the leaves to the preceding, but differs widely in the inflorescence, which is here very peculiar. The peduncles divide into two branches of equal length, on each of which the flowers are arranged by pairs, forming two racemes supported by a common peduncle.

3. Didymocarpus reptans. *Mal. Misc. vol.* i.

D. prostrata reptans, foliis petiolatis ellipticis crenulatis, pedunculis 1—3 axillaribus unifloris, staminibus duobus fertilibus.

Timmu Kichil. *Malay.*

Found in the forests of Pulo Penang with the preceding.

Stem prostrate, round, villous, striking root at every joint, often a foot in length. *Leaves* lying flat, opposite, petiolate, oblong-oval or elliptic, rather obtuse, sometimes slightly cordate at the base, slightly crenate, covered with white hairs, green above, paler and sometimes reddish beneath. *Petioles* villous. *Peduncles* one to three, axillary, one-flowered, erect, as long as the leaves, pilose, furnished with two bracts near the summit. *Calyx* five-parted, with erect acute laciniæ, the uppermost smaller. *Corolla* white, infundibuliform, sub-irregular, similar to that of *D. crinita*, but smaller as well as the whole plant. *Stamina* two fertile, conniving above, two sterile. *Anthers* approximate, reniform, two-celled. *Nectary* surrounding the base of the ovarium, obsoletely five-toothed at the margin. *Style* equal

to the stamina. *Stigma* simple. *Capsule* long, straight, silique-shaped, pseudo-quadrilocular, as in the genus. *Seeds* numerous, naked.

4. DIDYMOCARPUS CORNICULATA. *Mal. Misc. vol.* i.

D. erecta, foliis alternis obovatis acuminatis serratis, floribus fastigiatis secundis, pedunculo axillari elongato.

Found at Tappanooly in Sumatra.

The *stem* is nearly erect, from one to two feet in height, herbaceous or somewhat shrubby, villous. *Leaves* alternate, petiolate, obovate, acuminate, narrowing to the base, serrated, pilose above, villous below. *Peduncles* axillary, solitary, elongated, bearing several dense fascicles of flowers, all turned to one side, depressed or bent at an angle to the peduncle, and spreading in a kind of half-circle, somewhat in the manner of the *Lotus corniculatus*. *Flowers* many, white; *pedicels* articulate below the calyx, covered as well as the calyx with glandular hairs. *Bracts* linear, acute. *Calyx* five-parted; *segments* linear. *Corolla* white, much longer than the calyx, infundibuliform, wide at the faux; *limb* somewhat oblique, bilabiate, the lower lip longer, three-lobed. *Stamina* two fertile, connected above by their anthers, whose lobes are transverse. *Style* as long as the stamina. *Stigma* capitate. *Capsule* silique-shaped, two-celled; *cells* bipartite (as if four-locular), two-valved, generally bursting at one side, many-seeded. *Seeds* naked.

The disposition of the flowers and fruit is peculiar, the capsules spreading horizontally like radii in a sort of semicircle, of which the peduncle is the axis.

5. DIDYMOCARPUS

5. DIDYMOCARPUS ELONGATA.

D. herbacea erectiuscula didynama, foliis oppositis ovatis utrinque acutis serratis, spicis axillaribus secundis, pedicellis binatis remotis, corollâ elongatâ.

Found on Pulo Bintangor, an island lying off the west coast of Sumatra.

A small erect herbaceous plant, about half a foot high, pilose. *Leaves* opposite, petiolate, about five inches long, ovate, acute at both ends, serrated, papillous, and pilose with rather long hairs above, villous beneath with short hairs. *Petioles* channelled above, and ciliate along the edges of the furrow. *Stipules* none. *Peduncles* axillary, solitary, bearing a unilateral spike rather longer than the leaf. *Pedicels* in pairs, each pair rather remote. *Bracts* linear, at the base of the pedicels. *Calyx* five-cleft; *laciniæ* linear, acute, erect, tomentose, as well as the whole spike. *Corolla* tubular, somewhat curved, white, with a purplish tinge, slightly tomentose without, bilabiate; upper lip two-lobed; lower rather elongated, three-lobed. *Stamina* four, didynamous, each pair connected by their anthers. *Anthers* two-lobed, reniform. *Style* shorter than the stamina. *Stigma* thickened, emarginate. *Capsule* long, silique-shaped, pointed, two-valved, two-celled; *cells* bipartite (pseudo-quadrilocular): *seeds* attached to the revolute edges of the placentæ, which form the pseudo-partitions of the cells, numerous, small, not winged.

OBS. The remotely flowered secund spikes, and the nearly tubular corolla with elongated lower lip, distinguish this from all its congeners.

6. DIDYMOCARPUS

6. DIDYMOCARPUS BARBATA.

D. fruticosa, foliis oppositis ovatis subinæquilateralibus hirsutis, pedunculis gracilibus axillaribus fasciculatis 2—6-floris, staminibus quatuor apice barbatis: duobus sterilibus, calyce infundibuliformi.

Native of Sumatra.

Fruticose, erect, the older branches round, the younger somewhat compressed and furrowed on two opposite sides, scabrous. *Leaves* opposite, petiolate, ovate, somewhat inequilateral at the base, acuminate, entire, covered with bristly hairs above, each inserted on a small papilla or gland, villous beneath, with prominent nerves; about four inches long. *Petioles* about half an inch long. *Peduncles* axillary, fascicled, long and slender, smooth, forming an ascending curve, bifid or trifid, sometimes again divided, so as to be dichotomous, 2—6-flowered. At each division of the peduncle is situated a funnel-shaped bracteal cup, apparently composed of two opposite bracts united nearly their whole length. In the axillæ, at the base of the peduncles, the bracts are distinct and woolly. *Calyx* infundibuliform, persistent, smooth; *mouth* quinquefid. *Corolla* much longer than the calyx, infundibuliform; *limb* five-parted; *laciniæ* subrotund, nearly equal. *Stamina* four, of which two only are fertile and connected together by their anthers; the filaments of both are furnished at the summit with a tuft of wool. *Anthers* with transverse lobes. *Style* nearly as long as the fertile stamina. *Stigma* sub-lobate. The base of the ovary is surrounded by a nectarial ring, as in the genus. *Capsule* silique-shaped, four-furrowed, long, somewhat arcuate, pseudo-quadrilocular, many-seeded.

Seeds

Seeds naked, elongated, pendulous, inserted on the involute margin of the lobes of the dissepiment.

Obs. The pseudo-quadrilocular structure of the capsule is here remarkably distinct; it is a well-marked handsome species, having numerous flowers supported on long slender ascending peduncles.

7. Didymocarpus frutescens. *Mal. Misc. vol.* i.

D. caule suffrutescente erecto, foliis oppositis longe petiolatis ovato-lanceolatis utrinque attenuatis supra glabris subtus canescentibus, floribus axillaribus fasciculatis didynamis.

Native of Pulo Penang.

Stem generally simple, suffrutescent, densely covered with ferruginous appressed scales or chaffy hairs. *Leaves* opposite, long-petioled, ovate-lanceolate, acuminate, attenuated to the base, slightly serrated, eight or ten inches long, smooth above, hoary and tomentose beneath, with appressed hairs. *Petioles* three inches long, furrowed above, thickened at the base, villous. *Stipules* none. *Peduncles* axillary, fascicled, one- to three-flowered, shorter than the petioles, purplish. *Bracts* lanceolate acute. *Calyx* tomentose, with glandular hairs, tubular, five-parted; *laciniæ* linear, spreading above. *Corolla* white, tomentose without like the calyx, infundibuliform, incurved, all the laciniæ subrotund, obtuse. *Stamina* four, didynamous, arcuate, approximate at their summits, each pair connected by their anthers. The filaments of the upper pair are thickened below their middle. *Anthers* white, adnate to the filaments, consisting of two lobes nearly parallel. *Style* of the length of the stamina. *Stigma* truncate. *Capsule* long, linear, silique-shaped, two-valved, two-celled; *cells* two-parted by the septiform lobes of

of the dissepiment, which are revolute and seminiferous at their margins. *Seeds* numerous, naked.

LOXONIA.

Calyx 5-partitus. *Corolla* infundibuliformis, limbo quinquefido bilabiato. *Stamina* quatuor fertilia, corollâ breviora. *Stigma* bilobum. *Capsula?* ovata, calyce inclusa, bilocularis, polysperma; dissepimenti contrarii lobis revolutis seminiferis. *Semina* nuda.

Foliis oppositis altero nano, plerumque inæquilateralibus, floribus racemosis.

1. LOXONIA DISCOLOR.

L. foliis supra glabris, subtus retrorsum scabris purpurascentibus, racemis simplicibus elongatis.

Found in the interior of Bencoolen.

Herbaceous. *Stem* tomentose, purple, round, somewhat flexuose, recurved. *Leaves* opposite, bifarious, the one minute and reniform, the other sub-sessile, semicordate, ovate-oblong, falcate, acuminate, four or five inches long, slightly serrated; serratures recurved, in old leaves almost obsolete, smooth, and of a very deep-green above, retrorsely scabrous and purple beneath. *Racemes* simple, from the axils of the smaller leaves drooping backwards, long, slender, unilateral, tomentose, purple; *pedicels* short, alternate. *Calyx* five-parted, covered with red hairs; *segments* erect, acute. *Corolla* smooth, of a delicate yellowish-green colour, streaked on the inside with purple lines, much longer than the calyx, bilabiate; lower lip three-lobed; upper two-lobed; lobes shallow; faux furnished with two perpendicular

lar villous lines from the incisions of the lower lip; a villous ring within the tube immediately below the insertion of the stamina. *Stamina* four, all fertile, didynamous, shorter than the corolla; the opposite anthers connected together. *Style* one. *Stigma* two-lobed. *Capsule?* inclosed in the persistent calyx, ovate, two-celled; cells divided by the revolute lobes of the dissepiments. *Seeds* naked, roundish, foveolate.

Obs. The parietes of the capsule are very thin, and I have not yet been able to observe exactly their dehiscence.

2. Loxonia hirsuta.

L. hirsuta, foliis semiovatis latis, pedunculis 2—4-fidis, floribus racemosis.

Native of Sumatra, interior of Bencoolen.

Stem recurving, somewhat flexuose, hirsute. *Leaves* opposite, sub-bifarious, very short-petioled, the one small and semi-cordate, the other semi-ovate, broad, acuminate, slightly serrated, rugose, hirsute on both sides; about five inches long and two or two and a half broad. *Peduncles* from the axils of the small leaves, looking backwards, dividing into from two to four unilateral racemes, shorter than the leaves. *Calyx* five-parted. *Corolla* bilabiate, five-lobed. *Stamina* four fertile, didynamous. *Anthers* with transverse lobes. *Style* simple. *Stigma* obtusely two-lobed. *Ovary* two-celled, polysporous, the lobes of the dissepiments revolute and seed-bearing.

ÆSCHYNANTHUS.

Calyx ventricoso-tubulosus, 5-fidus. *Corolla* limbo subirregulari. *Stamina* 4 antherifera, exserta, sæpius rudimento quinti. *Capsula* longissima, siliquæformis, bivalvis, pseudo-4-locularis, seminibus numerosis (aristatis).

Suffrutices debiles, foliis carnosis, floribus coccineis.

The capsules of this genus nearly resemble those of *Didymocarpus*, and exhibit with great distinctness the peculiar character of this family. The seeds are attached to the whole of the inner surface of the lobes, and are singular in being awned. The exsert stamina and crimson flowers are further deviations from the usual habit of its congeners.

1. ÆSCHINANTHUS VOLUBILIS.

A. caule volubili, calycibus glabris.

Found in the neighbourhood of Bencoolen.

Stem suffrutescent, weak and twining, round, smooth. *Leaves* opposite, petiolate, oval, acute at both ends, very entire, very smooth, rather fleshy; nerves indistinct; two or two inches and a half long. *Petioles* downy on the edges. *Stipules* none. *Peduncles* axillary, two-flowered; *pedicels* longer than the peduncle. *Bracts* two, opposite, large, ovate. The axil is sometimes occupied by a flower-bearing branchlet, which has the appearance of a many-flowered peduncle. *Calyx* tubular, somewhat campanulate, smooth, five-cleft at the mouth, persistent. *Corolla* of a crimson colour, longer than the calyx, sub-ringent; *tube* curved; upper lip erect, two-lobed; segments small and approximate; lower three-parted, segments larger and reflexed. *Stamina* five, of which four are fertile and exsert, the middle one sterile; the fertile stamina are at first connected by their anthers, but

but afterwards diverge from each other. *Ovary* surrounded by a fleshy nectarial ring, which is marked with five lobes. *Style* nearly as long as the stamina. *Stigma* sub-bilabiate. *Capsule* silique-shaped, eight to ten inches long, two-valved, two-celled; *cells* bipartite by the revolute lobes of the septa; *dissepiments* composed of two laminæ easily separable. *Seeds* very numerous, attached to the inner surface and edge of the lobes, small, oblong, furnished with a long thread or awn at each end, and having a rounded apophysis above.

2. ÆSCHYNANTHUS RADICANS.

A. caule radicante, calycibus villosis.

Simbar burong. *Malay.*

Found in the forests of the interior of Sumatra growing on the trunks of old trees, with its root sometimes on the ground, sometimes on the tree.

Branches long and slender, radicating at the joints. *Leaves* opposite, short-petioled, varying from ovate to elliptic-lanceolate, sometimes almost cordate at the base, acute, very entire, the margins somewhat reflexed, villous, thick, fleshy and veinless, whitish, and finely punctate with depressed dots beneath; from one to two inches long. The old leaves become quite smooth, particularly on the upper surface. *Peduncles* axillary, sometimes also terminal, generally two-flowered, villous. *Flowers* drooping, of a deep crimson colour. *Bracts* two, at the base of the pedicels. *Calyx* tubular, villous; mouth quinquefid. *Corolla* more than twice as long as the calyx, villous without; tube gibbous at the base, contracted opposite the middle of the calyx, infundibuliform above and somewhat curved; limb subringent; upper lip erect, two-lobed; segments small and approximate, lower three-parted. *Stamina* four, exsert;

sert; *anthers* two-celled, each pair united by their apices; there is no rudiment of a fifth stamen. *Style* a little longer than the stamina. *Stigma* thick, somewhat funnel-shaped. *Capsule* pedicellate, about eighteen inches long, cylindrical, two-valved, two-celled, cells bipartite by the revolute lobes of the septa. *Seeds* very numerous, aristate at both ends, precisely as in the preceding species.

EXPLANATION OF THE FIGURES IN TAB. II.

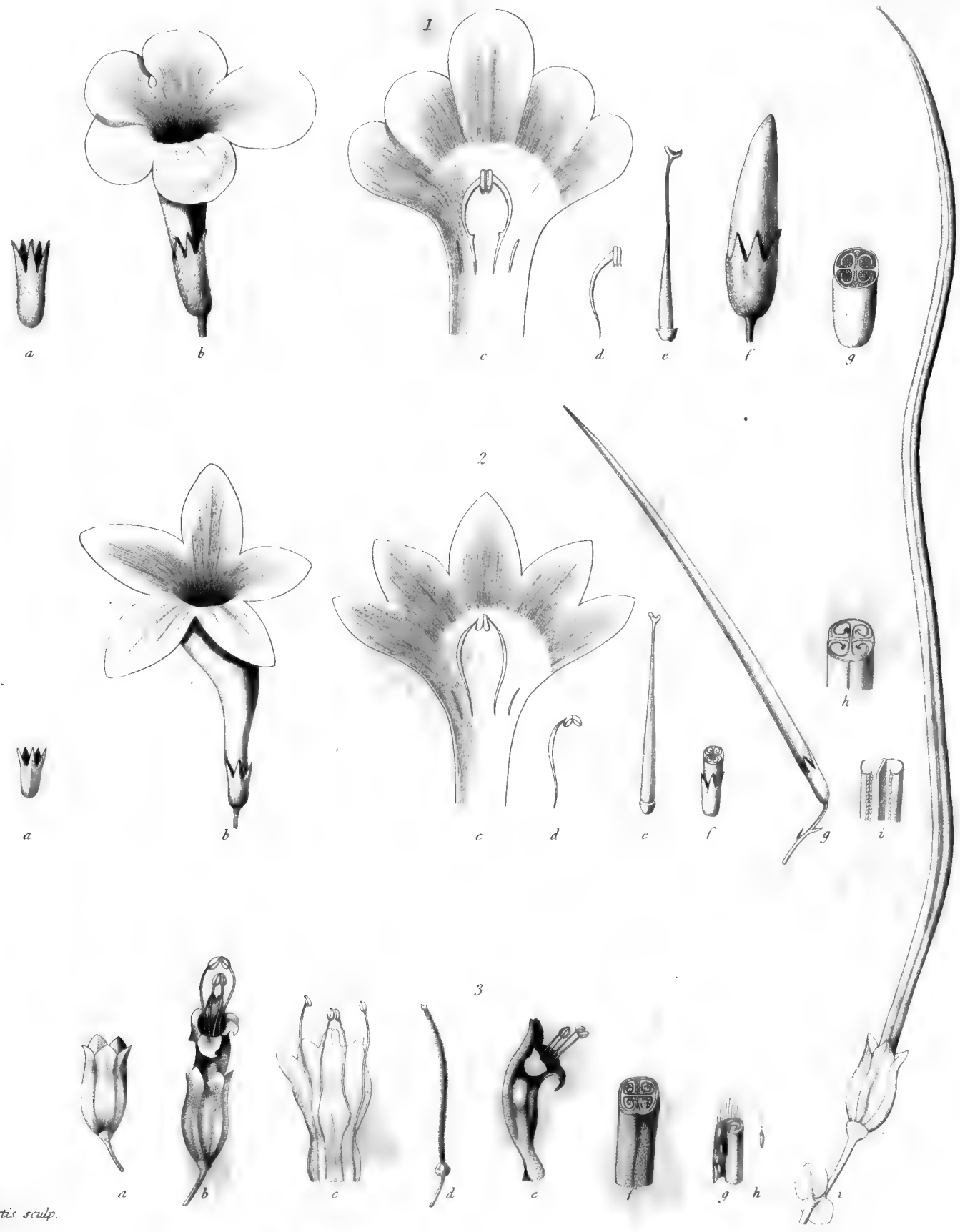
Fig. 1. *Cyrtandra macrophylla.*

a. The calyx.
b. The flower.
c. The corolla cut open, showing the stamina.
d. A fertile stamen separate.
e. The pistil with its nectarial ring.
f. The fruit.
g. A transverse section of the same.
All these are of the natural size.

Fig. 2. *Didymocarpus crinita.*

a. The calyx.
b. The flower.
c. The corolla cut open, showing the stamina.
d. A fertile stamen.
e. The pistil with its nectarial ring.
f. A transverse section of the capsule.
g. The capsule.
All these are of the natural size.
h. A transverse section of the capsule magnified.
i. One of the dissepiments with its revolute lobes, showing the manner in which the seeds are inserted in their margin, magnified.

Fig.



J. Curtis sculp.

Fig. 3. *Æschinanthus volubilis.*

a. The calyx.
b. The flower.
c. The corolla laid open.
d. The pistil.
e. The corolla seen sideways.
f. A transverse section of the capsule.
g. One of the revolute lobes of the septum, showing the seeds attached to its inner surface.
h. A seed, aristate at both ends.
i. The capsule.

III. *Remarks*

III. *Remarks on the Identity of certain general Laws which have been lately observed to regulate the natural Distribution of Insects and Fungi. By W. S. MacLeay, Esq. M.A. F.L.S.*

Read November 5, 1822.

THE naturalists of the present day have in one respect a peculiar claim to the appellation of disciples of Linnæus; inasmuch as they direct their chief attention to what this great master declared to be the end of all his immortal labours in botany. His admirable maxim, that the natural system is the "*ultimus botanices finis*," is now not only universally admitted, but on all sides acted upon. The natural system is in fact not only made the remote consequence, but the immediate aim, of every modern observation in natural history; the rule now being, to commence with supposing nothing known but what has actually been observed, and by comparing the affinities thus collected, to search after that knowledge of natural groups which in the old methods we started with supposing to be already acquired. They who formerly confined themselves to artificial systems, and neglected the above important maxim of Linnæus, have at least thereby lost much gratification, since, if there be nothing within the whole range of human science more worthy of profound meditation than the plan by which the Deity regulated the creation; so most assuredly no study is more calculated to administer pure and unmixed delight. Thus, for example, the satisfaction of the mere gazer at a collection of animals

animals must evidently be inferior to that experienced by the comparative anatomist, who understands their respective structures. And again, the anatomist himself, on viewing a museum, can scarcely be so much gratified by the sight, as that naturalist who, not content with a bare and in some degree insulated knowledge of particular organizations, endeavours to comprehend how these harmonize with the rest of the creation. It is in this last mode alone, if I may so express myself, that the human mind can take, as far as its imperfect nature will permit, a view of the universe as it was originally designed. Nor ought any person to be deterred from commencing so delightful a pursuit, either by the supposed difficulty of the investigation, or by the extent of preparatory information which it necessarily requires: for truly has it been said, that he who questions his abilities to arrange the dissimilar parts of an extensive plan, or fears to be lost in a complicated system, may yet hope to adjust a few pages without perplexity.

Having such ideas both of the dignity of natural history and of the importance and feasibility of a more extended research into the natural system than has yet been made, we can scarcely fail to be interested by a late work*, of which the perusal has induced me to address this learned body. Although this work is confined to a department of botany not very generally studied, its author has evidently not been satisfied with the specific discrimination of the imperfectly organized subjects of his research, but has earnestly sought to discover the relations which they bear to each other. Keeping this object steadily in view, M. Fries has been able to give so connected and symmetrical an outline of what he considers to be the natural distribution of *Fungi*, as, at

* *Systema Mycologicum* sistens Fungorum Ordines, Genera, Species, &c. quos ad Normam Methodi Naturalis determinavit, disposuit atque descripsit Elias Fries, &c. vol. i. Gryphiswaldiæ, 1821.

least

least in my opinion, to merit the careful attention of zoologists as well as botanists. It will readily be imagined that, in saying this much, I do not, in the presence of so many more able judges, presume to advance any positive opinion on his merits as an observer. I confine myself entirely to that theory or reasoning founded by M. Fries upon the general result of observations, which it would be impossible to suppose altogether incorrect, even if his reputation as a cryptogamist were less than it really is. On this head, however, I have to remark that our author, although undoubtedly an original observer, is neither the first who has advanced this theory, nor do *Fungi* compose the only part of organized matter in which this sort of arrangement has been conceived to exist. So that even with respect to his theory I may be a partial judge, and may probably be more inclined to admit the validity of his conclusions, than will be deemed prudent by others who are altogether unprejudiced.

M. Fries justly remarks, that the notion of the celebrated Bonnet, as to the existence of a simple series or chain of natural affinities, has been long exploded. The truth however is, that the law of continuity has been quite misunderstood both by Bonnet, and his opponents, so far as organized matter is concerned: for Bonnet fancied that, if affinities were continuous, the series must therefore be simple: and some modern naturalists finding by experience the series not to be simple, therefore supposed that affinities could not be continuous, but that nature presents to the view a mass of unconnected groups, in which it would be a waste of time and a loss of labour to search for any general plan. It does not however appear that either of these inferences has been very philosophically drawn; for there is a certain rule in natural history which originates solely in observation, and which, if properly followed up, will infallibly induce

induce us to grant to Bonnet the truth of his proposition, that affinities are continuous, and yet to agree with his opponents that the series of natural beings is not simple. This rule is, that *Relations of Analogy must be carefully distinguished from Relations of Affinity;* for, as our author M. Fries most truly says, "*Quo magis in superficie acquieverunt naturæ scrutatores, eo magis analoga cum affinibus commutârunt.*"

The ideas of affinity and analogy are so distinct from each other in the mind of every person acquainted with the first principles of logic, that even while this distinction was not laid down as an axiom in natural history, experienced naturalists perceived that every correspondence of character did not necessarily constitute an affinity. Thus the celebrated Pallas, in his *Elenchus Zoophytorum*, has well observed that Bonnet, in order to complete his linear scale of nature, was obliged to abandon the true vinculum of affinity, and to resort to such superficial or analogous characters as those which connect *Vespertilio* and *Exocætus* with birds. But the nature of the difference which exists in natural history between affinity and analogy, was I believe first discovered in studying Lamellicorn Insects; and in the year 1819, when I published that discovery, the fifth part of an acute philosophical work, entitled Botanical Aphorisms*, appeared in Sweden, wherein the distinguished cryptogamist M. Agardh proves by the following words, that he likewise had a slight glimpse of the same truth: "Analogia quædam et similitudo in diversis seriebus vegetabilium interdum cernatur, quasi progressa esset natura ad perfectionem per eosdem gradus sed diversâ viâ.†"

The

* *Aphorismi Botanici,* quos veniâ Ampliss. Ord. Philos. Lund. Præside Carolo Ad. Agardh, &c. pro Gradu Philosophico, p. p. N. Kuhlgren, &c. p. v. Lundæ, 1819.

† In the same little tract M. Agardh makes two other observations, which coincide with what I have noticed in the Animal kingdom. The first is as follows: "Inter inferiores formas superiores sæpe efflorescunt, sed rudes et veluti experimenta; sic anti-

The next work in which the distinction appeared was the *Mémoires du Muséum d'Histoire Naturelle;* in a part of which, published in the autumn of 1821, a paper was inserted by M. Decandolle on the natural family of *Cruciferæ*. Here this botanist states, that he finds it possible to express in a table all the affinities existing in this family of plants by what he terms a *double entrée;* in other words, he supposes that there are transversal affinities as well as direct ones,—a notion of the reality however which appears to be much more confused than that previously entertained by M. Agardh and explained as above in his Botanical Aphorisms.

In the same year (1821) likewise appeared the abovementioned work of M. Fries on *Fungi*, which is explicit on the subject, and wherein the very same expressions of affinity and analogy are used to designate these different relations, which I had applied to them two years before in treating of Lamellicorn Insects*. The

cipationes formæ perfectioris in plantis inferioribus non raro obveniant; ut etiam in plantis superioribus regressus ad formam imperfectiorem." Now in the *Horæ Entomologicæ*, p. 223, I have attempted to show that Nature, in the imperfectly constructed *Acrita*, sketches out in a manner the five principal forms of the animal kingdom. So also the direct return of Annulose *Vermes* to *Acrita* is repeatedly asserted in the same work: this however seems to depend more properly on M. Agardh's other observation, viz. "Duplex est itaque affinitas plantarum, aut ea, quæ oritur e transitu ab unâ formâ normali ad alteram, aut ea, quæ versatur imprimis in anticipatione formæ superioris aut regressu in formam inferiorem. Illam affinitatem *transitus* appellamus, hanc *transultationis*." This affinity of *transultation* is evidently nothing else than the disposition observable in opposite points of the same series or *transitus* of affinity to meet each other, and of which I have given various examples in the *Horæ Entomologicæ*, p. 319.

* I owe my acquaintance with these several works, as well as much information on points of which I should otherwise have been totally ignorant, to the friendship of the consummate botanist, in whose possession the Banksian Library has been so worthily deposited. The second part of the *Horæ Entomologicæ* was published in April 1821. On the 24th of the following month I first saw a copy of M. Decandolle's paper, which was not published till some weeks after; and in the course of last winter I first

The theoretical difference between affinity and analogy may be thus explained*: Suppose the existence of two parallel series of animals, the corresponding points of which agree in some one or two remarkable particulars of structure. Suppose also, that the general conformation of the animals in each series passes so gradually from one species to the other, as to render any interruption of this transition almost imperceptible. We shall thus have two very different relations, which must have required an infinite degree of design before they could have been made exactly to harmonize with each other. When, therefore, two such parallel series can be shown in nature to have each their general change of form gradual, or, in other words, their relations of affinity uninterrupted by any thing known; when moreover the corresponding points in these two series agree in some one or two remarkable circumstances, there is every probability of our arrangement being correct. It is quite inconceivable that the utmost human ingenuity could make these two kinds of relation to tally with each other, had they not been so designed at the creation. A relation of analogy consists in a correspondence between certain parts of the organization of two animals which differ in their general structure. In short, the test of such a relation is barely an evident similarity in some remarkable points of formation, which at first sight give a character to the animals and distinguish them from others connected with them by affinity; whereas, the test of a relation of affinity is its forming part of a transition continued from one structure to another by nearly equal intervals. As a relation of analogy must always depend

first saw Agardh's paper and the work of M. Fries on Fungi. If M. Fries borrowed from his master Agardh the idea of distinguishing affinity and analogy, which is not improbable, we must at least allow him the merit of having greatly improved this part of the theory.

* See *Horæ Entomologicæ*, p. 362 *et seq.*

on some marked property or peculiarity of structure, and as that of affinity, which connects two groups, becomes weaker and less visible as these groups are more general, it is not in the least surprising, that what is only an analogical correspondence in one or two important particulars, should often have been mistaken for a general affinity.

M. Fries draws the distinction between them precisely in the same way, and, making allowance for the difference of the objects he was investigating, almost in the same words: "Natura tamen, ubique varia, semper tamen eadem, hoc est, eandem ideam exponere tendit, mutatis modo, quæ ex ulteriori ratione necessario pendent; eadem sequitur principia, ita modo ut inferiora (v. g. exterior forma, quæ in infimis adhuc vaga) superioribus cedant. Errant igitur qui distinctiones summas e formâ exteriori tantum ducunt; quis ex hac regnum animale et vegetabile definire potuit? Evidentissimè hoc demonstrant Lichenes et Fungi. Recentiores horum differentiam in characteribus externis tantum ponentes cum Fungis jungere voluerunt *Leprarias*, *Opegraphas*, *Calicia*, *Verrucarias*, &c. quod nullo modo probare possum. Altius illorum differentia deducenda. Sed cum natura eâdem viâ inter Lichenes et Fungos ubique progreditur, singulum genus Lichenum Fungis correspondet. At hæc inde *affinia* non dicimus; sed *analoga*.

"*Affinia* igitur sunt quæ in eadem serie sequuntur et in se invicem transire videntur. Hæc in ulterioribus congruunt sed in citerioribus rationibus differunt. *Analoga* autem dicimus quæ in diversis seriebus locis parallelis* posita sunt et sibi invicem corre-

* As there is some danger of being led astray by our imagination when we first attempt to separate relations of analogy from those of affinity, it is fortunate that the naturalist cannot have a more admirable test of his accuracy, or a stronger rein on his fancy, than this parallelism of analogous groups in contiguous series of affinity. Thus, although

correspondent. Ultima cosmica momenta differunt, sed citeriora congruunt, quæ in habitu externo et characteribus accidentalibus mutandis maxime valent. Ubicumque in Historiâ naturali oculos convertimus, singulum organismum multiplicia hujus offerunt exempla. Systema mycologicum infra explicatum his omnino nititur. *Clavaria* et *Peziza*, *Biatora* et *Bæomyces* affines sunt; sed *Clavaria* et *Bæomyces*, *Peziza* et *Biatora* analogæ, *e. s. p.* in infinitum.

"Comparatio Linnæana affinitatis plantarum cum mappâ geographicâ haud ignobilis visa fuit; ignoscatur igitur mihi hanc ita extendenti, ut affinitas in hac indicet longitudinem et analogia latitudinem.

" Neque hoc tantum in inferiores classes quadrat. Naturæ leges ubique harmonicæ. Si systema mycologicum et principia, quibus nititur, omnibus non displicerent, totius regni vegetabilis dispositionem demonstrare conabor. Plurima jam elaboravi."

Relations of affinity being thus separated from those of analogy, we immediately get the following facts from the observation of what M. Agardh terms the affinity of *Transitus*, namely, that species form the only absolute division in nature, and that no groups of species (whatever may be the rank of these groups) ought to be considered as insulated, but only as series of affinities returning into themselves, and forming as it were circles which touch other circles. Such only are natural groups. This was said of Insects*; and our author, looking only at plants, and principally at *Fungi*, comes to the same conclusion, as appears from the following words: " Species unica in naturâ fixè circumscripta idea. Superiores nullas agnovimus sectiones

although a solitary resemblance may mislead, it is clear that when we find several of such resemblances to keep parallel to each other in contiguous series, we may reckon upon their having some more solid foundation than our own fancy.

* *Horæ Entomologicæ*, p. 459 &c.

strictissimè

strictissimè circumscriptas, tantum circulos plus minus clausos, affines vero ubique tangentes. Hos tribus, genera, sectiones, &c. simulque si naturæ vestigia sequuntur, naturales dicimus."

That the circle, indeed, is not always closed or complete has been observed likewise in the animal kingdom; and there are two ways of accounting for it. First, that the beings which would render the circle complete have not yet been discovered; a conclusion to which we readily arrive on considering how little is yet known of natural productions; and secondly, that there are *hiatus* or chasms which do really exist in nature, and which may be attributed to the extinction of species in consequence of revolutions undergone by the surface of this globe. Whether one only or both of these reasons be requisite to account for circles of affinity not always appearing complete, we shall not at present investigate; contenting ourselves with the undoubted fact, that *hiatus* or chasms are everywhere in nature presenting themselves to the view. But this truth by no means contradicts the Linnean maxim, that no *saltus* exists in nature, although such has been esteemed its effect by certain naturalists who have been in the habit of taking the words *hiatus* and *saltus* as synonymous terms*. Thus the series of the *Systema Naturæ* and of the *Règne Animal* is not natural where the *Cetacea* intervene between Quadrupeds and Birds, but is perfectly consonant with nature where the Tortoises are made to follow these last. In the first case, there is a *saltus* or leap from Quadrupeds to Birds over a group totally dissimilar to the latter; there is, in short, an unnatural interruption of the law of continuity, which shocks not merely the naturalist but the ordinary observer. In the

* It is to be regretted that Professor Dugald Stewart should have been led into this common error, and thus have acquired a somewhat erroneous notion of the law of continuity as it refers to natural history. See the second part of his admirable Dissertation, as prefixed to vol. v. of the *Supplement* to the *Encyclopædia Britannica*.

other

other case there is only an *hiatus* or chasm, which the discoveries of a future day may fully occupy. Speaking therefore theoretically, it may be affirmed that a *saltus* never did exist in nature; and it also may be argued, with great appearance of truth, that if the *hiatus* are real which so commonly occur in nature, they did not always exist; or, in short, as M. Fries expresses himself, "*Omnis sectio naturalis circulum per se clausum exhibet.*"

Now this definition of a natural group could never have been given by any person who was not aware of the distinction to be made between affinity and analogy. But whenever two parallel series of objects linked by affinity are drawn up in array, the connexion of their extremes, that is, the formation of the circle, becomes in that very moment, so far as I have observed, more or less conspicuous.

It follows, moreover, from admitting the existence of analogical relations, or, in other words, from laying down the parallelism of groups in different series of affinity, that the number of groups in these series must be the same. For were it otherwise, as for instance, supposing three groups to exist in one complete series, and four in another, it is clear that the parallelism could not exist. But if this parallelism be real, which has been, as shown above, asserted independently of each other by several naturalists acting in different branches of natural history, then the number of groups of the next lower order composing a group of a given degree must be determinate. And if, moreover, we accord to our author the accuracy of the following rule, namely, "Nunquam negligendum, unumquodque regnum, ordinem, genus, &c. in systemate ut individuum esse sumendum;"—in other words, that class bears the same relation to class which order does to order, and genus to genus; then the number of groups composing *any* group of the next higher degree

degree must be determinate; and it only remains for the naturalist to discover from observation what this number is.

That Nature has made use of determinate numbers in the construction of vegetables has long been known empirically; as for instance, where botanists have found the typical number of parts of fructification in the acotyledonous plants of Jussieu to be two, that in monocotyledonous plants to be three, and that in dicotyledonous plants to be five, or multiples of these numbers. Consequently the existence of a determinate number in the distribution of the plants themselves might have been argued *à priori*. And in this manner indeed M. Fries appears to have argued; for it is tolerably clear that it was the consideration of the foregoing rule, adopted by Nature in the structure of acotyledonous plants, which induced him theoretically to assume four as a multiple of two to be the determinate number in which *Fungi* are grouped*. I say this, because he is obliged from actual observation to admit that of these four groups, one is excessively capacious in comparison with the other three, and is always to be divided into *two*. So that we may either, with M. Fries, consider every group of *Fungi* as divisible into four, of which the largest is to be reckoned as two,—a supposition that would not only make two determinate numbers, but which, from the binary groups not being alway analogous, will moreover break the parallelism of corresponding groups,—or we may account every group as divisible into five, and thus not only agree with M. Fries's observations, but besides keep the parallelism of analogies uninterrupted. If in this state of the matter it could now

* It ought here to be observed, that Ocken had previously advanced the opinion that four was the determinate number in natural distribution. This naturalist, however, having in his *Natúrgeschichte für schulen*, lately published, in a great measure abandoned the number four for five, and that more especially in the animal kingdom, has thus got into all the difficulties which necessarily attend the supposition of two determinate numbers.

be

be shown, that in the animal kingdom the same law is followed by nature; in short, to take an instance, if it could be proved that the *Annulosa* may either be divided into four groups, viz. *Ametabola*, *Crustacea*, *Arachnida* and *Ptilota*, where this last is remarkably capacious and divisible into two natural groups, viz. *Mandibulata* and *Haustellata*, or that annulose animals may be divided at once into five groups of the same degree, but of which two have a greater affinity to each other than they have to the other three—if, I repeat, this could be proved, should we not be justified in affirming that the rule, so far as concerns Insects and Fungi, is one and the same? The possibility of thus distributing the annulose animals has, however, been demonstrated already in the *Horæ Entomologicæ;* and it is the way in which we ought to take the rule that only now remains to be investigated. In short, since only two methods* have yet been found to coincide with facts as presented by nature, the question is, whether we ought to account *Fungi* as divisible into five groups, or into four of which one forms two of equal degree. Now I think it may without difficulty be shown, from our author's own observations and rules, that there is only one determinate number which regulates the distribution of *Fungi*, and that five is this number.

* The number seven might also perhaps, for obvious reasons, occur to the mind, were it allowable in natural history to ground any reasoning except upon facts of organization. The idea of this number is however immediately laid aside, on endeavouring to discover seven primary divisions of equal degree in the animal kingdom. It is easy, indeed, to imagine the prevalence of a number; the difficulty is to prove it. The naturalist, therefore, requires something more than the statement of a number, before he allows either a preconceived opinion or any analogy not founded on organic structure to have an influence on his favourite science. He requires its application to nature and its illustration by facts. As yet, however, no numbers have been shown to prevail in natural groups but five, or, which is the same thing, four of which one group is divisible into two. Perhaps, indeed, the most clear method of expressing ourselves on this subject is to say that, laying aside osculant groups, every natural group is divisible into five, which always admit of a binary distribution, that is, into two and three.

In the first place, M. Fries lays it down as a rule, which is quoted above, that he admits no groups whatever to be natural unless they form circles more or less complete. Let us then apply this rule to what he terms his central group, and which he makes always to consist of two. Does this form a circle? If not, the group cannot be natural according to his own definition.

If, on the other hand, its two component groups are each circles, then these are natural. Thus the *Ptilota* will not form one circle, but two; consequently they form two natural groups, which is furthermore proved by their parallel relations of analogy. If we turn to Fungi also, the *Hymenini*, according to M. Fries, do not form one circle, but two; one of *Pileati*, the other of *Clavati;* so that instead of the *Hymenomycetes* forming four natural groups, viz. *Sclerotiacei*, *Tremellini*, *Uterini*, and *Hymenini*, they form, if our author be correct, five; viz. *Sclerotiacei*, *Tremellini**, *Uterini*, *Pileati*, and *Clavati*.

But, to understand this still better, we had as well perhaps enter a little deeper into our author's theory. Every group, he says, which expresses well the character of the superior group to which it belongs, is called the *centrum;* by this, not meaning the centre of a circle, but the site of the normal form or perfection of the particular structure common to the superior group, of which it forms a part. The word *perfection*, even as here used, requires explanation; for it does not, as might be supposed, in this place signify affinity to any particular group. Our author, on the contrary, most properly says, that the idea of perfection in structure has nothing to do with affinity†. "Ipsa hæc affinitas

* This appears to be one of those interesting groups which connect the least perfectly organized beings with those which are the most perfectly organized. In the department of *Hysterophyta* it is to the *Coniomycetes* or lowest *Fungi*, what in the animal kingdom the *Vermes* are to the *Acrita*.

† To the general observations on this subject, as connected with the animal kingdom,

tas imperfectionem potius indicat; perfectissima enim sunt in quâvis sectione ab omnibus aliis remotissima. Sic perfectissima animalia et vegetabilia, quæ maxime a se invicem remota; infima, quorum limites confluunt." Hence it follows, that the *centrum*, or perfection of a group, is in fact that part of the circumference of the circle of affinity which is farthest from the neighbouring group, and exactly the same thing with what in the *Horæ Entomologicæ* has perhaps more happily been called *Type*.

Indeed the confusion arising from the use of the word *centrum*, as applied to a point in the circumference of a circle, is still increased by applying the word *radii* to those groups likewise in the circumference which lead from one centrum or type to another, and which I have termed *annectent groups**. The use of these terms *centrum* and *radii* is the more unfortunate, as our author never for a moment takes them in any other sense than that in which I have used the expressions *type* and *annectent groups*. When, therefore, he says that in every group, whether class, order, &c. there are a *centrum* and *radii*, we must understand him as meaning, that there are in every circle first a *type* or normal form expressing the perfection of the superior group to which it belongs; and secondly, *annectent groups* connecting this type with other groups. Or, to take his own words, "In *centrum* quod

dom, which I have given in *Horæ Entomologicæ*, p. 205, I may add the botanical authority of Professor Schweigger. "Nec etiam genera et ordines plantarum in lineam a cryptogamicis ad dicotyledoneas progredientem ita disponi possunt, ut familia quævis præcedentis structuram magis evolutam præbeat. Vix ullus de vegetabilium serie usitata, a cotyledonum numero deducta, affirmat, plantas dicotyledoneas omni ratione monocotyledoneis esse anteponendas." p. 6. *De Plantarum classificatione naturali Disquisitionibus Anatomicis et Physiologicis stabilienda Commentatio, Auctore A. F. Schweigger, &c. Regiomonti* 1820.

* There are several other terms used by M. Fries to designate his groups, and which differ from those employed by me to express the nature of similar groups. Thus, his *intermediate genera* are my *osculant genera*; his *subordinate genera* are my *types of form* or *sub-genera*, &c.

species plurimas continet, character optime quadrat. *Radii* ad reliquas classes (scilicet ordines, genera, &c.) abeuntes, utriusque classis characterem conciliant, sed ad illam (viz. the typical group) cujus character maxime eminet referuntur."

If then the determinate number in which *Fungi* are naturally grouped be four, and if it thus appears that, according to M. Fries, every natural group is a circle, having in its circumference a point of perfection or typical group called a *centrum*, and annectent groups called *radii*, it is evident that there must be one centrum and three radii for every group. But observe what immediately follows as the result of M. Fries's observation: "*Centrum* abit semper in duas series, inferiorem et superiorem, quarum illa ad antecedentem hæc ad sequentem classem (l. radium) evidentius accedit."

This rule being determined, M. Fries goes on moreover to say, that these two series which compose the *centrum* are always analogous at their corresponding points. Consequently, in every circle he admits the existence of two central groups and three radial; that is, in all, five natural groups. Now this truly is the case throughout the whole animal kingdom. Organized matter is the *centrum* of matter, and is composed of animals and vegetables. *Articulata**, or animals possessing an articulated axis, form the centrum of the animal kingdom, and are composed of *Vertebrata* and *Annulosa*. The *Ptilota* of Aristotle, or winged insects, form the centrum of the *Annulosa*, and are divided into *Mandibulata* and *Haustellata*. And so on, we shall ever find a natural group to be a circle of five minor groups, and that two of these minor groups form what M. Fries would call a *centrum*, or, more correctly, have some character in common which distinguishes them from the other three. That neither of these groups, viz. organized

* This name has been applied to the *Annulosa*, as characterizing them alone, but improperly, inasmuch as the vertebrated animals are articulated.

matter,

matter, *Articulata* or *Ptilota*, is a circle, must be obvious to every observer; and consequently they do not fall within the sphere of M. Fries's definition already given of a natural group, but each of them form two circles, which therefore, according to our author, are natural groups. We might turn even to the well-known great division of the vegetable kingdom into phænogamous or cotyledonous and cryptogamous or acotyledonous plants, where the former are clearly the *centrum*, and divisible into two natural groups; but surely enough has been said to show, that the notion of M. Fries on this head is in every respect, but the mode of expressing it, the same identically with mine. When he states the determinate number to be four, and we investigate the signification attached by him to this proposition, we discover that it is in effect five. How M. Fries was led to the number four, we have already endeavoured to explain; and it is truly worthy of observation, as an almost conclusive argument for the determinate number being five, that M. Fries himself is at last obliged to adopt it. This open abandonment of his theoretical number *four*, which we have seen that he had virtually abandoned before, takes place moreover in that part of his work which, relating to the more minute groups, is therefore most independent of theory, and most subjected to the keenness of practical observers. Here, in brief, he finds himself tied down to stubborn facts, and it is rather interesting to mark the result. The only genera of *Hymenomycetes Pileati* which he discovers to be divisible are, *Agaricus*, *Cantharellus*, *Thelephora*, *Hydnum*, *Boletus*, *Polyporus* and *Dædalea*, some of which, as *Agaricus*, are, as he says, of the first dignity; others, as *Cantharellus*, of the second*. Now every one of these genera, or at least their typical groups, are divided by M. Fries himself into five, with the

* The groups here said to be of the second dignity, appear to be of the same degree with the genera *Phanæus* and *Scarabæus* of the *Horæ Entomologicæ*.

single

single exception of *Cantharellus*; and so truly natural or dependent upon relations of analogy are these five subdivisions, that he proposes to make use of one set of names for all, and in fact does in general make use of the same name for analogous groups*. Nay more: when he has divided the well-known genus *Agaricus* into *five* natural series, he observes, "Singula series a naturâ fixè determinata clausa est reliquis parallela. Tribus diversarum serierum analogas diu eodem nomine salutavi." So that *Agaricus* is, according to the confession of M. Fries, formed of five natural series each closed up; in other words, each a circle, and corresponding at their parallel points to such a degree, that he declares it possible to assign the same names to the analogous groups.

It were tedious to proceed much further on this subject; and therefore, without entering into the speculations, often unintelligible and always vague, of Plutarch, Sir Thomas Brown, Drebel, Linnæus and others, as to the doctrine of *quintessence* generally, we may at once set forth the last argument which shall now be produced for the existence of a quinary distribution in organized nature. It may be stated thus: In the year 1817 I detected a quinary arrangement† in considering a small portion of coleopterous insects; and in the year 1821 I attempted to show that it prevailed generally throughout nature. In the same year (1821), and apparently without any view beyond the particular case then before him, M. Decandolle stated the natural distribution of Cruciferous plants to be quinary. And again, in the same year, a third naturalist, without the knowledge of either Decandolle's *Mémoire* or the *Horæ Entomologicæ*, and in a different part of Europe, publishes what he considers to be the natural arrangement of *Fungi*. Arguing *à priori*, this third natu-

* These five names are, *Mesopus*, *Pleuropus*, *Merisma*, *Apus*, and *Resupinatus*.

† Published in 1819.

ralist

ralist fancies that the determinate number into which these acotyledonous plants are distributed ought to be four; but finds it necessary, in order that it may coincide with observed facts, to make it virtually five. Nay, at last, in spite of the prejudice of theory, he is unable to withstand the force of truth, throws himself into the arms of Nature, and declares that where he actually finds his natural group complete in all its parts, there the determinate number is *five*.

Now, on considering that his work was given to the world two years after the first part of the *Horæ Entomologicæ*, it is clear that, had M. Fries fixed at once on the number five, there might have been room for supposing, that he had not altogether trusted to his own observation, but had borrowed the idea of a quinary distribution. As matters however at present stand, this supposition cannot for a moment be harboured; and I cannot help rejoicing that the strength of this beautiful theory should be so completely brought home to the conviction of every mind, as it must be, by observing the manner in which different persons have respectively stumbled upon it in totally distinct departments of the creation. We may all possibly be wrong in part, or even in much of our respective details; but however this may be, it is difficult not to believe that we are grasping at some great truth, which a short lapse of time will perhaps develop in all its beauty, and at length place in the possession of every observer of nature.

It may be well to note, that M. Fries draws in the clearest manner a distinction between his *Hysterophyta* or *Fungi*, and the *Protophyta*, which is a natural group consisting of the Linnæan *Algæ* and *Lichenes*. He proves that they form two distinct series of vegetables having analogous exterior forms at their corresponding points. Hence, according to what has preceded, the *Protophyta* and *Fungi* form in the vegetable kingdom two primary groups

groups of equal degree. In *Protophyta* fructification is secondary, and the thallus essential; whereas in *Fungi* it is quite the reverse. According to our author the first-born of Flora may all be accounted as essentially *roots*, and representing the mode of nutrition; while every fungus is as truly and representatively connected with fructification and reproduction. Throwing aside other considerations, we may perceive the analogous groups of the animal kingdom to be likewise constructed on a similar plan. Each of the *Acrita*, for example, imbibing nourishment at every pore of their surface, internal or external, is essentially a stomach, while the situation of the singular ovaries of the *Radiata* cannot fail to remind us of the importance and position of the sporidia in *Fungi*. The umbellate *Medusa*, the *Echinus*, the *Asterias*, and the *Priapulus* have all their representatives in mycology, of which the genera *Lycoperdon* and *Phallus* are noted instances; so that the analogy of the Radiated animals to *Fungi* is complete; and we thus have in organized matter the following two series of groups connected by affinity and analogous at their corresponding points.

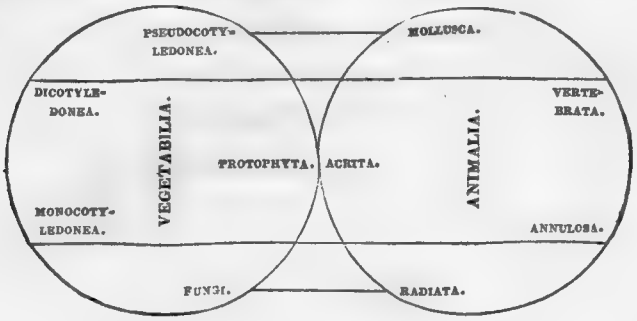
Animalia.	Vegetabilia.
Acrita	Protophyta.
Radiata	Hysterophyta.
Annulosa	Monocotyledonea.
Vertebrata	Dicotyledonea.
Mollusca	Pseudo-cotyledonea? *Agardh**.

Con-

* This last department of the vegetable kingdom, *Pseudo-cotyledonea*, has been defined by M. Agardh in the sixth part of his *Aphorismi Botanici*, which is dated December 1821. According to him it embraces the *Musci*, *Hepaticæ* and *Filices* of Linnæus; and in page 76 of the same work we find a comparison made between these plants and *Amphibia*, which is nevertheless much stronger when applied to them and the *Mollusca*. "Pseudo-cotyledoneæ Amphibiis non dissimiles, humum perreptant

vel

Consequently some general idea of the primary distribution of all organized beings may be obtained from the following figure.



To conclude: If an arrangement be natural, it will stand any test; and to support the truth of this proposition, I shall now arrange

vel rimas quærunt, humiditateque gaudent ut illa, organis jam in superiore sectione deperditis iterum instructæ." In these last words he alludes to his own opinion, that Mosses display organs nearly related to the cotyledons of dicotyledonous plants, while the monocotyledonous plants conceal their cotyledon; and if botanists should adopt this opinion, we might assimilate it to the curious fact, that in the animal kingdom the imperfectly organized *Mollusca* display a heart, which is more analogous to that of the *Vertebrata* than the dorsal vessel of insects. With respect, indeed, to the analogies existing between the animal and vegetable kingdoms, they are too striking to have altogether escaped the notice of such an observer as Agardh, who truly observes, "Memorabilis est analogia evolutionis seriei vegetabilis cum animali." When we find him, however, comparing the least perfect vegetables to some of the most perfect animals, the *Algæ* to Fishes, and the *Lichenes* to Insects, we must suspect that he is not sufficiently acquainted with the *evolution* of the animal series, and conclude that he has at least not sufficiently attended to the parallelism of analogy. Nevertheless, his comparison of Monocotyledonous, or, as he terms them, of Cryptocotyledonous Plants to Birds, appears to be a true relation of analogy, although an indirect one; and if he had paid that attention to Entomology which the science really merits, so acute a botanist could not have failed to perceive, that the arguments he gives in support of this last analogy, only receive their full force when they are employed in the comparison of Monocotyledonous Plants with Insects. Thus, in the same page, he states aëriferous cells to be peculiar to Birds in the animal kingdom, evidently not aware that many more animals than are in the whole department of *Vertebrata* would have no means

arrange Annulose Animals in the same way that M. Fries has distributed his Fungi, when it will readily be seen as virtually nothing else than the arrangement I offered to the public in the *Horæ Entomologicæ*. Thus it is only necessary that instead of subjecting Nature to arbitrary rules of our own invention, we should humbly receive her laws as she clearly proclaims them; when she will indeed appear, as M. Fries has found her to be, "ubique varia, semper tamen eadem."

Classification of Annulosa *on the same Principles as those adopted by M. Fries in his natural Distribution of Fungi.*

Annulose Animals, which are not hermaphrodite: or the Annulosa of Scaliger may all be divided into two groups founded on their larva or fœtus state, viz.

1. *Apterous Insects*, having either no metamorphosis in the usual sense of the word, or only that kind of it the tendency of which is confined to an increase in the number of feet.

of getting their fluids aërated did not the air enter their bodies and penetrate through every part of them. But on this head Desfontaines long since set the scientific world at rest, when he established the relation of Dicotyledonous Plants to *Vertebrata*, and of Monocotyledonous Plants to *Annulosa*, not on external appearance merely, but on such primary principles of their respective structures, that we may almost term the former tribe of plants Vertebrated, and the latter Annulose. It would scarcely be fair however towards M. Agardh, did we conceal the fact of his being perfectly aware of the analogies which reign both between the Dicotyledonous Plants and the typical group of *Vertebrata*, and between the *Fungi* and *Radiata*. With respect to this last analogy, indeed, the following words are perhaps more explicit than those previously published, p. 211 of the *Horæ Entomologicæ*—"Fungi superiores animalia Radiata ob figuram radiantem, ob superficiem nudam, ob texturam laxam, ob colorem subsimilem non male revocant."

These

These are the APTERA of Linnæus, and comprehend three classes, viz. *Crustacea*, *Arachnida*, and *Ametabola*, which would be termed *Radii* by M. Fries.

2. *True Insects*, being all subject to that kind of metamorphosis which has a tendency to give wings to the perfect or imago state, but never more than six feet.

These are the PTILOTA of Aristotle, and should, according to M. Fries, be termed the *Centrum* of Annulose Animals. "*Sed centrum abit semper in duas series*," and consequently we find that the

PTILOTA

either become by metamorphosis organized for mastication in their perfect state, and are the	or become by metamorphosis organized for suction in their perfect state, and are the
MANDIBULATA of *Clairville*, which comprise the following orders, viz.	HAUSTELLATA of *Clairville*, which comprise the following orders, viz.
1.	1.
Metamorphosis obtect.	Metamorphosis obtect.
Larvæ eruciform.	Larvæ eruciform.
TRICHOPTERA?	LEPIDOPTERA.
2.	2.
Metamorphosis incomplete, or coarctate.	Metamorphosis incomplete, or coarctate.
Larvæ apod or vermiform.	Larvæ apod or vermiform.
HYMENOPTERA.	DIPTERA.

3.	3.
Metamorphosis incomplete.	Metamorphosis incomplete.
Larvæ of various types.	Larvæ . . . . .
Coleoptera.	Aptera.
	The only larva of this order known is apod or vermiform, but of the coleopterous structure.
4.	4.
Metamorphosis semicomplete.	Metamorphosis semicomplete.
Larvæ resembling the perfect Insects.	Larvæ resembling the perfect Insects.
Orthoptera.	Hemiptera.
5.	5.
Metamorphosis various.	Metamorphosis various.
Larvæ hexapod.	Larvæ hexapod.
Neuroptera.	Homoptera.

N.B. A mark of doubt is annexed to the word *Trichoptera*, because entomologists have not yet determined whether the Linnæan genus *Phryganea* forms part of an annectent order, or whether it forms a distinct osculant order.

IV. *Some*

IV. *Some Particulars of the Natural History of Fishes found in Cornwall. By Mr. Jonathan Couch. Communicated by Sir James Edward Smith, M.D. F.R.S. Pres. L.S.*

Read February 19, 1822.

Several years have passed since I began to collect information respecting the Fishes which have been met with in the Cornish waters; and my materials, drawn principally from personal investigation, became so considerable, that I announced my intention of speedily submitting them to the public attention. But circumstances, over which I have little control, have hitherto frustrated the design; and not seeing a probability of its being soon put in execution, I desire to lay the following sketch before the Linnean Society. I omit an account of those habits and instincts of the subjects of this communication, which are generally known, that I may not trespass unnecessarily on the attention of the Society.

APODAL FISHES.

Muræna.

Eel. *M. Anguilla.*—The Eel may be considered as a migratory fish. The young ones as soon as they are produced (which in the sphere of my observation is always within the reach of the tide) begin to advance up the river; and to accomplish this object, overcome difficulties of an extraordinary

dinary kind. I have seen them, at the fall of a river, dive below the moss, that hung from above into the water, and *worm* themselves upward through the fibres by the side of the stream, resting at intervals as if to recover strength; and at last, when at the top, exert their utmost activity to stem the rapid current and reach a place of safety. In getting up the little cataract that pours over a sloping rock, they prefer those places which are only moistened by the droppings from above; but those which quit the moisture altogether, as I have seen some do, are obliged to alter their course, and proceed to places more easy for them to travel in. The motive for this migration, which is general among young Eels, I have not been able to discover. Some among them I have observed to be so diaphanous that the vertebræ may be counted; and, taking advantage of an opportunity of this kind, I ascertained that when in a state of activity, and not alarmed, the pulsations of the heart were forty in a minute.

Conger. *M. Conger.*—This fish frequents rocky ground, and is frequently found concealed in holes of rocks. When hooked on a long line moored in the sea, it will sometimes escape by twisting its body round until the hook is wrenched from the jaws or the cord broken. It uses the same expedient when it seizes its enemy, and thus sometimes inflicts a very dangerous wound. It will draw itself overboard by the help of its tail; but is disabled by a blow on the vent.

Xiphias.

Swordfish. *X. Gladius.*—I have not seen this fish taken, but it is often met with by fishermen.

Ammodytes.

Ammodytes.

Launce. *A. Tobianus.*—This fish is gregarious; it keeps in deep water in winter, but in summer and autumn frequents sandy bays, where it is preyed on by many kinds of fish. The fleshy process that points the lower jaw is excellently adapted to enable it to bury itself in the sand, which is the method it takes to escape its pursuers. It is common to see in the little companies that are moving along near the surface, one that is much larger than the others, which seems to act as captain, and leads the advance.

JUGULAR FISHES.

Callionymus.

Dragonfish. *C. Lyra.*—This fish is extremely rare, and has never fallen within the reach of my observation.

Skulpin. *C. Dracunculus.*—I have given the common English name of this fish, because I in general prefer it to that which is arbitrarily bestowed by naturalists. It keeps at the bottom in stony places, and is sometimes found to take a bait. The skin is always besmeared with a large quantity of tenacious mucus.

Trachinus.

Greater Weever. *T. Draco.*—I have known such effects to arise from the puncture of the spine on the gill-covers of this fish, as can only be accounted for on the supposition of its conveying some venomous quality. In three men who were wounded by one fish, the pain and tension proceeded from the hand to the shoulder in a few minutes.

Gadus.

GADUS.

§ Cirri at the Mouth.

Haddock. *G. Æglefinus.*—This fish appears to be continually changing its quarters. It comes into season at the beginning of winter, at which time it is taken in more considerable numbers than before.

Cod. *G. Morhua.*—It is taken through the year, but is more plentiful in winter than at other times, being then also in season. This fish, with probably others of this genus, possesses filaments between the teeth and lips, that seem designed to enable it to discover and select its prey. And how well they are able to fulfill their object, appears from the instance of a Codfish, which was taken on a line near this place (Polperro) a few years since. It was distinguished by the striking peculiarity of wanting both eyes. The sockets contained no eye-ball; and I am convinced that they never had existed, the common opake skin covering the sockets in a curiously reticulated manner. Yet the fish was large, and in good condition.

Bib. *G. Luscus.*—It frequents rocky places, and, though common, is rarely taken in great numbers. This fish has a singular faculty of distending the transparent covering of the eyes when taken; the fins also are often similarly blown up.

Poor. *G. minutus.*—The habits of this fish resemble those of the Bib. It comes into season in the spring, at which time it abounds. The two last named species are equal in delicacy as food to any of the genus.

Ling. *G. Molva.*—This fish is common at all seasons; but in January and February it approaches the rocky ground near the land in order to deposit its spawn; at which time it is taken in great numbers. The Ling is one of the most prolific of a prolific genus; I have known a roe weighing seven pounds

pounds taken from a fish whose weight was about forty pounds.

Rock-Ling. *G. Mustela.*—This fish makes a near approach to the genus *Blennius*, which in habits it very much resembles. It has no air-bladder; and not being endued with strength of fin, for the absence of which the air-bladder is a compensation, it continues at the bottom, near the shore, among the rocks and weeds. The variety of this fish which possesses five barbs has been supposed to be a distinct species; but from attentive examination I am convinced that this is a mistake: both varieties are common, frequenting the same places, and having no other marks of difference. Both of them are subject to great varieties of colour, from a light yellow with brown spots, to an uniform reddish-brown. Nor is the number of cirri an objection to this supposition, as I have seen the common Ling with two cirri at the throat.

All the species of the genus *Gadus* that are furnished with barbs are found to keep near the bottom, from whence they principally take their food; the sea egg (*Echinus*) and various species of crabs are found in their stomach; and the Ling is even found to devour the picked dog, *Squalus spinax*. Of the use of the ciliated membrane on the back of the Rock-Ling I am able to form no opinion; but I have remarked it to be always in motion in the water, even when the other fins are at rest.

§§ No Barbs.

Whiting. *G. Merlangus.*—It is found through the year, is gregarious, and frequents sandy ground.

Whiting Pollack. *G. Pollachius.*—This is a solitary fish, is common at all times, and at all times is equally good.

Rauning Pollack or Coalfish. *G. Carbonarius.*—This fish has

 acquired

acquired its common trivial name from its extreme rapacity, *rauning* being the Cornish pronunciation of ravening. It is sometimes found in great numbers, and is in season from the end of summer to the spring; but when it has deposited its spawn it becomes emaciated in an extraordinary degree. It is coarse food. In a fine summer evening large sculls of the young of this fish are seen in the coves and sandy bays sporting in all the luxuriancy of youth; whilst Cuttlefishes are employed in making that havock among them, which when fully grown they make among other fish.

Hake. *G. Merlucius.*—This fish seems to wander much through the ocean. When Pilchards make their appearance, it does not fail to accompany them, and is then taken in considerable numbers. In spring it drops its spawn in sandy ground, and at this season does not commonly take a bait. It is not much esteemed as food.

Those of this genus which have no barbs at the mouth swim at a higher elevation than the others, and take their food principally as it swims.

Blennius.

Shanny. *B. Pholis.*—This fish is incapable of sporting with freedom in its native element; on the contrary, being of a heavy make, and destitute of an air-bladder, as are most of the genus, it takes up its residence on some rock, from which it seldom wanders to any considerable distance; and, as if afraid to depend too much on its powers of swimming, which, though vigorous, are soon exhausted, it passes from one resting-place to another by the shortest way; and is commonly supposed to be in danger of perishing if thrown into deep water. When the tide retires, the rock which afforded

afforded it a resting-place provides for it also a shelter. Some are left in pools; but many take refuge in holes, where they remain until the returning tide restores them to liberty. It devours shell-fish, and with its strong incisor-teeth will even separate the testaceous covering of the embryo shell-fish from its attachment to the rock and devour it. I have observed of this fish, that when in its element it is capable of directing its eyes in different directions, one looking forward and the other backward at the same time.

Crested Blenny. *B. Galerita.*—This resembles the Shanny in most of its habits; but is not so common.

Butterfish. *B. Gunnellus.*—Frequents oozy ground.

Greater forked Beard. *B. Phycis.*—This fish keeps in deep water, and is not common. It has the habits of a *Gadus*, and in taste much resembles the common Ling. The Cornish fishermen call it the Hake's Dame. I would suggest that this fish might with propriety be placed in a genus, which might be denominated *Phycis;* and be distinguished by the barb at the throat. The ventral fins bear a greater resemblance to the fingers of the genus *Trigla* than to the ordinary fins of fishes. The dorsal and anal fins have the vestige of a junction to the caudal fin; a few spines are placed before the anal fin.

Lesser forked Hake.—The insertion of this species is on the authority of Mr. Jago in Ray's *Synopsis;* as I have never had the good fortune to meet with a specimen*. The

* Since this paper was read, I have met with the *Lesser Forked-Beard* of Jago Length ten inches; head wide and flat; eyes forward and prominent; under-jaw shortest; teeth in the jaws and palate, sharp and incurved, and some in the throat; small barb at the under-jaw; body compressed, smooth; first dorsal fin triangular and extremely small; second dorsal fin and the anal fin long, ending in a point; tail round; ventral fins have several rays, of which the two outmost are much elongated, the longest measuring two inches; the fins all covered with the common skin;

 a fur-

The three first species of this genus are destitute of a swimming-bladder: in the Hake's Dame this organ is bordered with a fringe of curious tubercles.

THORACIC FISHES.

CEPOLA.

Red Snakefish. *C. rubescens.*—Two specimens of this fish have come into my possession; one of them, about five or six inches in length, was taken with a line; the other, from which my description was taken, was thrown on shore in a storm. It measured fifteen inches in length, an inch and a quarter in depth at the deepest part, including the dorsal and anal fins, and was very thin; but the smaller specimen above alluded to was nearly round. It tapered both in depth and thickness toward the tail. The angle of the mouth was much depressed, which caused the under jaw to appear the longest; both were armed with long and sharp teeth. The eyes were large, and the head short before them. The dorsal fin was twelve inches in length, and had seventy rays; the anal fin was eleven inches long, and had sixty rays; the tail distinct, spear-shaped, of twelve rays, the middle rays being two inches long and ending in a point, and the rays at the sides not exceeding a fourth of that length. The ventral fins were pointed, and fastened to the body for about half their length by a fine membrane. Beside the lateral line there was a row of small bony prominences near the dorsal fin. The colour was a diluted red. From the inspection of several specimens, I am inclined to think that this ought to be ranked as a Jugular Fish.

a furrow passes above the eyes to the back; stomach firm, with longitudinal folds; no appendix to the intestines; air-bladder large, and of unusual form. In the intestines were the remains of an *Echinus*. This fish has all the marks of a *Gadus*, to which genus it appears to me properly to belong.—J. C.

GYMNETRUS.

GYMNETRUS.

Ceil Conin. *G. Hawkenii*, Bloch.—This fish was drawn on shore in a net at Newlin in this county, in February 1791. The extremity of the tail was wanting; the length of what remained was eight feet and a half, the depth ten inches and a half, thickness two inches and three quarters, weight forty pounds. A coloured drawing of this fish is in the possession of William Rashleigh, Esq. F.L.S. of Menabilly.

GOBIUS.

Spotted Goby. *G. Aphya.*—In the summer months this fish is found in numbers among the rocks.

Rockfish. *G. niger.*—This is much more rare than the former.

COTTUS.

Bullhead. *C. Gobio.*—There are many brooks in this county in which this fish is not known. This species and *C. Scorpius* want the air-bladder.

ZEUS.

Doree. *Z. Faber.*—This fish visits our coasts when Pilchards make their appearance, and continues until spring. Although it appears to move slowly through the water, it contrives to satisfy its voracity by the capture of fishes which possess considerable activity; it will even overtake and devour a Cuttle as long as itself.

PLEURONECTES.

§ With Eyes on the right side.

Holibut. *P. Hippoglossus.*—This is the largest of the genus; but I have not seen one exceeding a hundred and twenty-four pounds in weight.

With

§§ With Eyes on the left side.

Kite. *P. rhomboides.*—This species seems to unite Flat-fishes with those which swim on their edge, the under side often participating in the colour of the upper; I have seen it cover a third part of the under surface.

Whiff. *P. punctatus.*—The dorsal and anal fins pass under the tail, and are very nearly joined together on the white side. This species rarely, if ever, takes a bait. It keeps in rocky ground.

Pearl. *P. Rhombus.*—This seems to be scarce, at least within my observation.

Carter, or Lanternfish. *P. megastoma?* Don.—This is the species which Jago in Ray's *Synopsis* has figured under the name of Whiff; but it is different from *P. punctatus.* Teeth in both jaws and palate; gill-membrane with seven rays; body lengthened and very thin; ventral fins broad; tail somewhat round; lateral line very crooked at its commencement; colour of the upper-side a reddish-brown, with spots of a lighter colour round the sides; length about twelve inches. It is common, and as food is the worst of the genus. It is also called Marysole.

Chætodon.

Only one specimen of this genus has come within my notice. This was taken at Looe, swimming alive on the surface of the water, in August 1821; and as I have not been able to refer it to any described species, I subjoin a description.

It was about seventeen inches long, and, exclusive of the dorsal fin, five inches and a half deep; the snout was blunt, sloping suddenly above the eyes; the angle of the mouth depressed; the teeth numerous, sharp, incurved, four in front of the under jaw very long; the body deep, thin; two dorsal

sal fins, the first having flexible rays, the second long and narrow; tail very deeply lunated; the pectorals long; the ventrals double or having a wing, by which means it seemed to have four ventral fins; the anal fleshy, and somewhat expanded at the origin, obscure in its progress towards the tail; no lateral line; a broad band from eye to eye; the colour blue, deeper on the back than on the belly; covered with large scales, as well the body as the fins, so that the dorsals and anals seem like an extension of the body. I was unable to count the rays of the dorsal fins.

Sparus.

Bream. *S. Smaris.*—This is taken at all seasons, but chiefly abounds in summer and autumn; the young ones, called Chads, which have not the lateral spot until the second year of their growth, are in vast numbers in summer.

Becker. *S. Pagrus.*—This species is seen only in summer and autumn; the young ones never approach the shores like the Chads.

Oldwife. *S. Vetula*, C.—Although the English name here given to a species of *Sparus* is applied by naturalists to one of a different genus, yet I am obliged to use it to designate a fish presently to be described, as it is the only one which our fishermen make use of. The body is deep, compressed, and has a considerable resemblance to the *S. Pagrus;* the lips are fleshy, and the jaws furnished with a pavement of teeth, of which those in front are the longest; the gill-membrane has five rays; the gill-covers and body are covered with large scales. The ten first rays of the dorsal fin are spinous; the anal fin also has four spinous rays, after which it becomes more expanded; the tail is concave. This fish has a membranous septum across the palate, as in the Wrasse genus.

When

When in high season, the colour behind the head is a fine green, towards the tail it is a reddish-orange; the belly has a lighter tinge of the same colour. When out of season the whole is a dusky-lead colour. It weighs about three pounds.

These three species feed principally on sea-weeds, for the digestion of which they are furnished with long and capacious intestines; their teeth also are well adapted for bruising this food previous to its being swallowed.

Labrus.

Common Wrasse. *L. Tinca.*—This fish keeps in rocky ground, and feeds on crustaceous animals. The old Wrasse commonly assumes the dominion of his district, and keeps the younger ones at a distance; so that their numbers most abound where they are most fished for. They are not much esteemed as food.

Bimaculated Wrasse. *L. bimaculatus.*—Although this species is mentioned as a Cornish fish, I am not acquainted with it; but perhaps this will not be deemed a sufficient reason for doubting its existence as a distinct species.

Cook. *L. Coquus.*—The habits of this species and of *L. comber* are similar. In the summer they are found near the shore; in winter they pass into deeper water; but are taken by fishermen through the year, and are principally employed as bait for other fish.

Besides these and *L. cornubiensis*, I have noticed another species, which is by fishermen confounded with the *L. Tinca*, and which I am unable to refer to any Linnæan species. It differs from the common Wrasse in the following particulars: The body is longer in proportion to its depth, and somewhat thicker; the ventral fins, which in the *L. Tinca* reach just to the anus, in this reach but two-thirds of that distance; a light-coloured

coloured line runs from the eye to the tail; the anterior bone of the gill-cover has a smooth margin, but in the *L. Tinca* it is finely serrated; the lateral line also forms an acute angle at its curve, pointing downward in the *Tinca*; in this species it has a gentle curvature; it has twenty spinous rays in the dorsal fin. The colour of the back is a dark brown, lighter at the sides, saffron-coloured on the belly. It is common*.

SCIÆNA.

Basse. *S. Labrax.*—This fish is particularly fond of *Onisci*, in pursuit of which it ventures among the rocks in the midst of a tempest, as at that time these insects are frequently washed from their hiding-places. It also devours sea-weeds.

Stone Basse.—This species, which is common in more southern latitudes, and appears to be the *Pagrus totus argenteus* D. Sloane, *Ray Syn. Pisc.* i. 32, approaches the Cornish coasts under peculiar circumstances. When a piece of timber covered with Bernacles is brought by the currents from the regions which these fishes inhabit, considerable numbers of them sometimes accompany it. In the alacrity of their exertions they pass over the wreck in pursuit of each other, and sometimes, for a short space, are left dry on the top, until a succeeding wave bears them off again. From the circumstance of their being usually found near floating wood covered with Bernacles, it might be supposed that this shell-fish forms their food; but this does not appear to be the case, since in many that were opened nothing was found but small fishes. Perhaps these young fishes follow the floating wood for the sake of the insects that accompany it, and thus draw the Stone Basse after them.

* This appears to be a variety of *Labrus Julis*.

GASTEROSTEUS.

Pilotfish. *G. Ductor.*—Two of this species a few years since accompanied a ship from the Mediterranean into Falmouth, and were taken in a net.

SCOMBER.

§ With Finlets distinct.

Mackerel. *S. Scomber.*—This fish is taken on the Cornish coasts for nine months in the year. They have been brought to Plymouth so early as the fifteenth of March; and I have known numbers taken so late as the twentieth of December; those which were caught at this late period appeared to be of the same growth as those which come early in the spring. The females retire long before the males, perhaps to cast their spawn.

§§ With Finlets united.

Scad. *S. Trachurus.*—This species does not visit us so early as the Mackerel, nor do they unite into such considerable bodies; but it is common through the summer.

Albacore. *S. glaucus.*—I believe this fish is not uncommon in the summer; but keeping at a distance from the shore, and seldom taking a bait, it is but rarely taken.

MULLUS.

Striped Surmullet. *M. Surmuletus.*—This is a migratory fish, and usually reaches the Cornish shores about midsummer. Its common habit is to keep close to the ground; but the migration seems to be performed near the surface, since it is not uncommonly taken in nets spread for Mackerel, which are very shallow, at twenty leagues from land, at the season when they are drawing near the shore.

TRIGLA.

Trigla.

Piper. *T. Lyra.*—In some seasons this fish is rare, in others they abound.

Elleck. *T. Cuculus.*—This is always common.

Grey Gurnard. *T. Gurnardus.*—Fishes of this genus usually keep near the ground; but this species will mount to the surface over a considerable depth of water, and lie basking in the sun as if dead. At particular periods they abound in an extraordinary degree.

ABDOMINAL FISHES.

Salmo.

Salmon. *S. Salar.*—This fish, and indeed most others that frequent fresh waters, are in greater plenty in the eastern than in the western parts of this county; which seems to arise from the quantity of mineral substances that are thrown into the rivers.

Salmon Trout. *S. Trutta.*—This sometimes takes a bait at sea, which I believe the Salmon and Salmon Peal never do.

Palmer Trout. *S. Salmulus.*—This is not a common fish, but is found in the Trelawny river, a branch of the Looe. It is the Farthing Trout of Carew.

Common Trout or Shote. *S. Fario.*—This fish sports in innumerable varieties, as might be expected, when it is considered that any peculiarity which may arise is liable to be propagated through the river in which it occurs; for they have no opportunity of obliterating it by mixing with the fish of any other river than their own.

Esox.

Garpike. *E. Belone.*—This fish comes in April, and sometimes continues so late as near the end of December; after this it is not seen. It keeps at no great distance from the surface, and swims with great rapidity. When it swallows the hook, and finds itself restrained by the line, it mounts to the surface, and, with the body half out of the water, struggles to set itself free, even before the fisherman perceives that he has hooked a fish. The intestinal canal of this fish runs straight from the gullet to the anus, without any appendix or convolution, or distinction between the stomach and the bowels.

Skipper. *E. Saurus.*—This species does not take a bait. A native of the same climate, this fish nearly resembles the Flying-fish in its manners and its fate. Frequently, when the weather is fair, they are seen to spring from the bosom of the deep, pass over a space of thirty or forty feet, and plunge into the water to rise again in a moment and flit over the same distance. Sometimes this may proceed from wantonness, and sometimes probably from an impulse to escape from the voracious inhabitants of the deep: but it seems surprising that a fish so scantily provided with fins should be able to make such an extraordinary leap; for the pectoral fins, instead of reaching nearly to the tail, as in the Flying-fish, are very small; and though well adapted by their figure to raise and direct the head, cannot afford assistance in supporting the body in the air. The whole motion is effected by the action of the tail and finlets alone, and is more properly a leap than a flight. This is an excellent fish for the table.

Sea Pike. *E. Sphyræna.*—I have been informed that a fish of this

this genus, which I could refer to no other species but this, was taken some time since near Falmouth; but I have never met with a specimen.

Besides these, I have met with a species which I have never seen described, unless it be the *Esox Brasiliensis* Linn. *Syst. Nat.* It was taken by me in the harbour at Polperro, in July 1818, as it was swimming with agility near the surface of the water. It was about an inch in length, the head somewhat flattened at the top, the upper jaw short and pointed, the inferior much protruded, being at least as long as from the extremity of the upper jaw to the back part of the gill-covers. The mouth opened obliquely downward; but that part of the under jaw which protruded beyond the extremity of the upper, passed straight forward in a right line with the top of the head. The body was compressed, lengthened, and resembled that of the Garpike, *E. Belone:* it had one dorsal and one anal fin placed far behind and opposite to each other; the tail was straight. The colour of the back was a blueish-green, with a few spots; the belly silvery.

Mugil.

Grey Mullet. *M. Cephalus.*—This fish is known to exercise a considerable degree of cunning when it finds itself in situations of danger; and it is particularly difficult to take it with a net.

Clupea.

Herring. *C. Harengus.*—Although the North seems to be the region of Herrings, those which are found on the Cornish coasts do not come from that direction; nor do they at any time go to a great distance, as they are met with throughout the year, except perhaps for a short time in spring. The principal

principal fishery in Cornwall is carried on between October and Christmas.

Pilchard. *C. Pilchardus.*—This fish, so much the object of hope and expectation in Cornwall, does not retire to a great distance at any season, but makes its principal visit towards the end of summer, when it is taken in vast numbers. The fishing begins towards the end of July, and terminates about the time of the autumnal equinox; but in the memory of persons now living, it commenced at the period at which it now ceases, and continued until Christmas. Although Pilchards abound in immense multitudes, and are usually extremely fat, fishermen are unable to determine what it is on which they feed. They have no teeth to hold their prey, and never take a bait; but from frequent examination of the stomach, which is of a fine texture, I am inclined to believe that they principally subsist on the seeds of *Fuci*.

Shad. *C. Alosa.*—This is denominated the Alewife in the West.

Sprat. *C. Sprattus.*—Cornish fishermen do not appear to be aware of any difference between this fish and the young of the Herring and Pilchard. In this respect their sentiments are the same as those in Ray's *Synopsis Piscium* under this fish.

CYPRINUS.

Dace. *C. Leuciscus.*—I have some doubt whether this fish can be considered an original native of Cornwall, as I have not heard of its being found in any other river than that which runs by Launceston, where it may have been placed by some former possessor of Werrington Park, at which place it is chiefly found.

BRANCHI-

BRANCHIOSTEGOUS FISHES.

Cyclopterus.

Lumpfish. *C. Lumpus.*—This fish appears to reside in our seas through the year, but is not often taken. But a small fish of this genus, which I am rather in doubt whether I should consider as the young of this species, or another and distinct, is found plentifully in stony ground in four or five fathoms of water. It is rarely found longer than an inch, and differs from the *C. Lumpus* in the skin between the tubercles being quite smooth. If it be indeed the young of the above species, it seems surprising that when full grown it should not be more frequently taken.

Jura Sucker. *C. Cornubiensis.*—I have seen two varieties of this fish, if they were not distinct species; in one the snout is shaped like a spatula; in the other it was shorter, and ended in a point. The body and head are wide and depressed, with the eyes at the sides, and before each a double fleshy process, about the tenth of an inch long, in a fish that measured two inches; there is a fleshy tubercle close behind these processes. The lips membranous; the lower jaw a little the shortest, opening with a very wide gape. Behind the head are two dark spots, each with a blueish speck in the middle. The body tapers to the tail; the dorsal and anal fins begin at a third of the whole length from the tail, and run back to that part; the pectorals are far behind; the tail round. The sucking apparatus is formed of two circles, one before the other, furnished with numerous very small tubercles. The colour is dusky, sometimes crimson; the belly flesh-coloured. When the colours faded after death, I observed many spots on the sides, which were

were not visible before. It adheres with some degree of force. When the tide retires, this fish sometimes takes refuge under a stone.

Another species, which I do not recollect to have seen noticed, is not uncommon about low-water mark, where it hides under stones. The head is broad and flat, sloping from behind the eyes to the mouth. The body tapers from the pectoral fins to the tail; it is smooth, a dusky-yellow on the back and sides, the belly white; it has a row of white points along the lateral line, and also about the head and mouth, which secrete mucus. Thirteen tubercles form the sucking apparatus; but I could never get this fish to adhere to any substance. The tail is round; the dorsal and anal fins long, the former beginning just above the pectoral fins, the latter at the abdominal tubercles, and both run to the tail; which part, with the dorsal and anal fins, is crossed by dark bars. When this fish rests, it has a singular custom of throwing its tail forwards toward the head. It rarely exceeds an inch in length*.

TETRAODON.

Oblong Sunfish. *T. truncatus.*—Naturalists have been divided in their endeavours to account for the name of the Sunfish; but the appearance of the common Sunfish when in the water or newly taken, is sufficient to account for it. At this time the surface of the body has a bright and glittering appearance, as if coated with tin-foil; but in a short time after death this passes off.

* This is probably a variety of *C. liparis.*

CENTRISCUS.

Centriscus.

Trumpetfish. *C. Scolopax.*—A fish of this species was thrown on shore in St. Austel Bay, and came into the possession of William Rashleigh, Esq. of Menabilly, a gentleman distinguished for his love of natural history, who possesses a fine drawing of it. It was five inches long, and from the back to the belly one inch and two-eighths; in thickness three-eighths of an inch; it weighed three drams. The proboscis, which to the eye measured an inch and five-eighths, was formed of a bony substance, which was continued along the back, where it terminated in a sharp point, and spreading in the middle, where it makes an obtuse angle just above a small fin behind the gills.

CHONDROPTERYGIOUS FISHES.

Raia.

Torpedo or Cramp Ray. *R. Torpedo.*—This fish is extremely rare. The numbing power of the Torpedo has been much illustrated by the discoveries which have been made in galvanism; but the cause of this phænomenon appears to me not to have been explained. I would therefore suggest the following observations on this subject. It has been supposed, that by this faculty the Torpedo is enabled the more readily to secure its prey; and when Pennant took a Surmullet from the stomach of a Torpedo, he concluded that it must have been first disabled by the shock before it could have been swallowed by its enemy. But I have known a Lobster, whose agility is much superior to that of a Surmullet, taken from the stomach of a Skate; which fish possesses no such formidable means of disabling its prey. Without denying that the Torpedo may devour that which

it disables by the shock, I conceive that the principal use of this power has a reference to the functions of digestion. It is well known that an effect of lightning, or the electric shock, is to deprive animated bodies very suddenly of their irritability; and that thereby they are rendered more readily disposed to pass into a state of dissolution than they would otherwise be; in which condition the digestive powers of the stomach can be much more speedily and effectually exerted on them. If any creature may seem to require such a preparation of its food more than another, it is the Torpedo, the whole intestinal canal of which is not more than half as long as the stomach.

Squalus.

Monkfish. *Sq. Squatina.*—Common; keeps near the bottom, and is most commonly taken in nets. The propriety of ranking this fish with the *Squali* seems to me to be doubtful: the terminal mouth and depressed body afford sufficient distinctions for a new genus, which might be denominated *Squatina*, and in which the following species might find a place.

Lewis.—This fish, so named by fishermen, by whom it is not unfrequently taken with a line, bears some resemblance to the Monk, but is somewhat smaller; and as I have not been able to assign it a Linnæan name, I subjoin a description: The head is large, flat, the jaws of equal length, forming a wide mouth; the upper jaw falls in somewhat at the middle, so that at this part the lower jaw seems a little the longest; both are armed with several rows of sharp teeth; the tongue is small. The head is joined to the body by something which resembles a neck; the body is flat so far back as the ventral fins, beyond these it is round; the pectoral

pectoral and ventral fins are very large; the former are flat, and both have near their extremities a number of spines. The two dorsal fins are placed far behind; the lobes of the tail are equal and lunated. There are five spiracula; the eyes are very small, and the nictitating membrane, which is of the colour of the common skin, contracts over the eye, leaving a linear pupil. The body is slightly rough, of a sandy-brown colour; the under-parts white. It is about five feet long, and keeps near the bottom.

Tope. *Sq. galeus.*—I think this is the species which is by the fishermen denominated the White Hound; if so, it is very prolific, as thirty young ones have been taken from the belly of a single female.

Smooth Hound. *Sq. Mustelus.*—This keeps near the bottom, and feeds chiefly on crustaceous animals, which its blunt teeth are well calculated to crush.

Basking Shark. *Sq. maximus.*—A fish of this species, taken at Penryn in 1809, measured thirty-one feet in length, eight feet and a half high, and nineteen feet round; the mouth was five feet and a half wide; the extent of the tail six feet nine inches; the weight eight tons.

Porbeagle. *Sq. cornubicus.*—This fish rarely takes a bait; yet it is not uncommon, and hunts its prey in companies; from which circumstance it has received its common name.

There are in the possession of William Rashleigh, Esq. of Menabilly, a drawing and memorandum of a fish of this genus, which I am not able to refer to any known species; it was twenty-nine feet four inches long, twenty-four feet round, the fork of the tail seven feet, and the weight four tons; in the drawing, the eye is in front, under a snout that projects and is turned upward; the mouth is two feet and a half wide. The head is deep; the first dorsal fin

much elevated. This fish seems to resemble the Basking Shark, but differs from it in the form of the head and situation of the eye.

ACCIPENSER.

Common Sturgeon. *A. Sturio.*—Of an individual taken in a trammel-net near this place, the fishermen observed that it threw up several large bubbles of air as they raised it from the bottom; this I have no doubt came from the swimming-bladder; for on examination I found it empty; and the discharge appears to have been intended to prevent its ascent; it made no other effort to escape.

Polperro, Cornwall. JONATHAN COUCH.

V. *A De-*

V. *A Description of some Insects which appear to exemplify Mr. William S. MacLeay's Doctrine of Affinity and Analogy. By the Rev. William Kirby, M.A. F.R.S. and L.S.*

Read December 17, 1822.

No objects are more interesting to the scientific naturalist than those which assume the external appearance of one tribe, while their more essential characters and their habits indicate that they belong to another. These objects a *prima facie* survey would often induce us to refer to a very different set of beings from that to which a more intimate acquaintance with their peculiar diagnostics and economy would lead us. And we shall find, the further we extend our researches, the traces of that plan of Creative Wisdom by which a *symbolical relationship*, if I may so call it, connects such of his creatures, as in other respects are placed in opposition to each other, as well as a *natural affinity* those that really approximate. Writers in every department of natural history, when they have been endeavouring to thread the labyrinth of affinities, have been extremely puzzled by this remarkable circumstance. They were aware that those species which connect two proximate tribes, generally partake of the characters of both; but they were not sufficiently aware of this resemblance between objects that are connected by little or no affinity. Hence it has happened, not unfrequently, that objects have been referred not to the tribe to which they are really *related*, but to that which they resemble in some of their less essential characters.

Mr.

Mr. W. S. MacLeay, in his acute and learned *Horæ Entomologicæ*, has furnished the naturalist with a clue which, if heedfully followed, will enable him to guide himself through all the intricacies with which the circumstance here mentioned has perplexed his path. This gentleman has first stated with clearness and precision the distinctions, so often before confounded, between real affinity and those resemblances which are merely analogical; and has proved satisfactorily, that there exist between numerous objects in every department of nature striking coincidences as to external characters, which do not indicate that they are related to each other, or should be placed together in a natural arrangement.

In confirmation of the doctrine here alluded to, I have the honour to present to the Linnean Society a description of three new genera of insects which appear to wear the face of a tribe to which they do not belong.

COLEOPTERA PENTAMERA.

(*Harpalidæ.*)

CATASCOPUS *Kirby.*

Character Essentialis.

Labium s. *Ligula* tripartitum: lobo intermedio abbreviato; lateralibus apice latioribus. *Labrum* emarginatum.

Character Artificialis.

Labium tripartitum: lobo intermedio abbreviato.
Labrum emarginatum: lobis rotundatis.
Palpi maxillares articulo secundo incrassato.
Oculi magni, valde prominuli.
Tibiæ anticæ intus medio emarginatæ.

Character

Character Naturalis.

CORPUS subdepressum, oblongum, glabrum, alatum.

CAPUT horizontale, subtriangulare: collo distincto. *Labrum* subquadratum, apice emarginatum: lobis rotundatis*. *Mandibulæ* subtriquetro-trigonæ, apice forcipatæ incurvæ acutæ, edentulæ†. *Maxillæ* lobo interiori incurvo unguiformi acutissimo, exteriori palpiformi biarticulato: articulis longitudine æqualibus‡. *Palpi maxillares* quadriarticulati: articulo primo minutissimo; secundo reliquis longiori crassiori subarcuato; tertio secundo breviori subclavato: extimo teretiusculo§. *Labium* tripartitum: lobis coadunatis; lateralibus longioribus dilatatis semicordatis planis‖; intermedio lateralibus dimidio breviori convexo apice bisetigero¶. *Palpi labiales* triarticulati**? *Mentum* trilobum: lobo intermedio brevissimo rotundato††. *Antennæ* undecim-articulatæ subfiliformes: articulo primo incrassato; proximis tribus subclavatis sequentibus tenuioribus; reliquis oblongis compressis; extimo acuto‡‡. *Oculi* laterales, magni, valde prominuli. *Frons* apud oculos longitudinaliter bistriatus. *Nasus* s. *Clypeus* transversus: apice segmento circuli dempto.

TRUNCUS. *Thorax* quadrato-obcordatus, postice constrictus: angulis prominentibus, in medio canaliculatus, apud angulos posticos foveatus, antice et postice truncatus: lateribus marginatis. *Prosternum* lineare, apud basin pedum anticorum deflexum, apice rotundatum. *Mesosternum* brevissimum, apice emarginatum. *Metasternum* antice et postice mucronatum. *Scutellum* minutum, tri-

* TAB. III. Fig. 1. a. † *Ibid.* c. ‡ *Ibid.* d.
§ *Ibid.* d, *e*. ‖ *Ibid.* b. *bb*. ¶ *Ibid. c*.
** *Ibid. a a*. †† *Ibid.* e. ‡‡ *Ibid.* f.

angulare.

angulare. *Elytra* apice oblique præmorso-truncata. *Epipleura** linearis, apud basin elytri dilatata. *Tibiæ* calcaribus 2. 2. 2, anticæ intus ante medium emarginatæ. *Tarsi* articulo penultimo integro.

ABDOMEN in specimine nostro mutilatum.

At first sight the little insect exhibiting these characters might be mistaken for a species of *Notiophilus* of Duméril, or at least be regarded as belonging to a cognate genus. Its large and very prominent eyes, the shape in some measure of its thorax, the striæ of the disk of its elytra less impressed with puncta than those of the limb, as likewise its frontal furrows, give it no inconsiderable appearance of affinity to it. But a closer inspection proves that this is merely an *appearance*, and that in fact it belongs to a different tribe connected with the *Harpalidæ*. *Notiophilus* and its genuine affinities are distinguished by a particular character indicating some difference in their mode of taking or retaining their prey. The great majority of the *Carabi* of Linné are remarkable for a notch on the inner side of their anterior tibiæ, armed at its upper angle by a spur, which appears to be of use to them for the above purpose. In the *Harpalidæ* and many others this notch is nearly in the *middle* of the tibia; but in *Notiophilus* and its affinities its situation is close to its apex†. *Catascopus*, with respect to this part, falls into the former tribe‡. Again, in *Notiophilus* the labium consists only of a single lobe, or at least the lateral ones are much shorter than the central§; but in the *Harpalidæ* they are as long or longer‖. In *Catascopus* also they are very conspicuous, being twice the length of the central lobe¶. In *Elaphrus*, *Notiophilus*, *Blethi-*

* See this term explained *Linn. Trans.* xii. 377.

† TAB. III. Fig. 2. g, *a*. ‡ *Ibid.* Fig. 1. g, *a*. § *Ibid.* Fig. 2. b, *c*.

‖ Clairville *Ent. Helvet.* ii. *t.* x. xi. xii. &c. *c*. ¶ TAB. III. Fig. 1. b. *dd*.

sus,

sus, &c. the fore-breast (*antepectus*), or the part immediately under the thorax, is more or less covered with impressed puncta. In the *Harpalidæ* and *Catascopus* it is quite free from them. In the former tribe likewise the legs, especially the thighs, are slenderer and less robust than in the latter. The head moreover in *these* is narrower behind, so as to form a distinct neck; whereas in *those*, if any thing, it is widest behind, and the neck is formed by the convexity of that part and not by any constriction of it. From all these circumstances, I think, it is sufficiently evident that the relation of *Catascopus* to the *Harpalidæ* is that of *affinity*, while that which it bears to the *Elaphridæ*, insects which at first sight it most resembles, is merely that of *analogy*. But there is still another tribe of which it exhibits many characters, I mean those which constitute M. Latreille's first section of his *Carabici*, which have the head and thorax much narrower than the abdomen, and truncated or very obtuse elytra; for instance, *Anthia*, *Brachinus*, *Lebia*, &c.; and with these at one time I felt inclined to arrange the genus I am considering; but the different characters of the *Labium* convinced me that it ought rather to go with the *Harpalidæ*. Should any master in Entomology hereafter undertake a new arrangement of *Carabus* L., he may perhaps bring the *Harpalidæ* and the above section nearer to each other; and in this case *Catascopus* would very well connect the two tribes. The exact place of the genus I have not been able satisfactorily to ascertain. Of all the known genera of the *Harpalidæ* it seems to approach nearest to *Pterostichus* Bon., or *Sphodrus* Clairv., principally on account of the shape of the thorax; but there must be several intermediate links between them.

Hardwickii. 1. C.

TAB. III. Fig. 1.

Long. corp. lin. $4\frac{1}{4}$.

Habitat in India a D. Hardwicke lectus? Ex Mus. D. Marsham.

Corpus nitidum nigrum, supra violaceo et viridi tinctum. *Labrum* infra apicem utrinque punctis duobus impressis setigeris. *Frons* antice in medio canaliculatum. *Elytra* sublacunosa striata: striis, præcipue lateralibus, punctatis. Puncta insuper tria impressa inter striam a sutura secundam et tertiam. *Elytri* latera viridi-ænea.

The individual specimen here described being transfixed by the same peculiar pin which Major-General Hardwicke used for all the small insects that he collected in India, (many of which he gave to the late Mr. Marsham, at whose sale I purchased it,) I think I am warranted in my conjecture that this was one of them. I have therefore named it after this indefatigable collector and observer of insects, who merits richly to be so distinguished. There are two or three species apparently belonging to this genus in the rich collection of insects brought by Dr. Horsfield from Java.

(*Scolytidæ?*)

PSEUDOMORPHA, *Kirby.*

Character Essentialis.

Labium apice tridentatum. *Palpi maxillares* breves cylindrici.

Character Artificialis.

Labium apice tridentatum: dentibus æqualibus, rotundatis.

Labrum transversum, integrum, apice rotundatum.

Palpi labiales articulo extimo maximo, securiformi.

—— *maxillares* maxilla haud longiores, cylindrici.

Antennæ breves.

Caput transversum sessile.

Character

Character Naturalis.

CORPUS depressum, oblongum, alatum.

Caput transversum, subrhomboidale, leviter inclinatum, thoracis sinu receptum, sessile. *Labrum* transversum, apice rotundatum*. *Mandibulæ* forcipatæ, breves, subtriquetro-trigonæ, apice edentulæ acutæ, basi intus in lobum rotundatum dilatatæ†. *Maxillæ* breves: lobo interiori incurvo unguiformi acutissimo, intus setis ciliato; exteriori palpiformi biarticulato lobo interiori arctissime incumbenti‡. *Palpi maxillares* maxilla vix longiores, incrassati, cylindrici, quadriarticulati: articulis brevibus; primo reliquis minori obconico, sequentibus duobus cylindricis æqualibus, extimo paulo longiori apice truncato§. *Labium* minutum, brevissimum, apice tridentatum vel subtrilobum: lobis rotundatis; intermedio setis duabus instructo‖. *Palpi labiales* securiformes triarticulati: articulo primo brevissimo; secundo paulo majori subtriangulari; extimo maximo fere trapeziformi¶. *Mentum* trilobum: lobis subæqualibus, acutis**. *Antennæ* capite longiores, undecim-articulatæ, filiformes: articulo primo incrassato arcuato; secundo sequentibus breviori apice incrassato; reliquis longitudine fere æqualibus, oblongiusculis, extimo acuto††. *Oculi* laterales, minus prominentes, subrotundi. *Nasus* declivis, apice transversus.

Truncus. *Thorax* transversus, antice angustior, sinu lato pro receptione capitis exciso; lateribus rotundatis marginatis: margine explanato recurvo; angulis anticis et posticis rotundatis. *Prosternum* et *mesosternum* linearia. *Metasternum* antice et postice mucronatum. *Scu-*

* Tab. III. Fig. 3. a. † *Ibid.* c. ‡ *Ibid.* d, *b a.* § *Ibid. c.*
‖ *Ibid.* b. *b b c.* ¶ *Ibid.* b. *a a.* ** *Ibid.* e. †† *Ibid.* f.

tellum triangulare. *Elytra* oblonga latere exteriori marginata: margine subrecurvo, apice obtusissima, vel oblique subtruncata: epipleura lineari apud basin elytri dilatata. *Pedes* breves: femoribus magnis compressis; tibiis tenuioribus; calcaribus 2. 2. 2.; anticis intus ante medium emarginatis*: tarsis subsetaceis; articulo penultimo integro: unguiculis binis simplicibus.

ABDOMEN depressum: segmentis ventralibus sex; tertio reliquis longiori; anali obtusissimo.

Catascopus merely assumes the aspect of a section different from that to which it really belongs, while every one sees at first sight that it is one of the *Carabi* of Linné; but the insect I have now described, though it exhibits the *characters*, has not the *aspect*, of that tribe; and even a practical entomologist, if he chanced to examine a specimen that had lost its antennæ, might at first regard it as a *Nitidula* or *Ips* F., or as coming near that genus in the system. But when he came to study it in detail, he would discover, to his surprise, all the essential diagnostics of one of Latreille's *Entomophagi*, as six palpi†, and the trochanter forming a fulcrum to the posterior thigh‡; and further, those that distinguish the *Carabici* of that author, the same kind of *labium*, *mentum*, and *maxillæ*, and particularly the remarkable notch in the inside of the anterior tibia, before noticed, peculiar to them. The characters that give it an air and general appearance unlike those of its tribe, are its sessile wide head received into the thorax, and its short antennæ and legs§.

It is difficult to say to which of Latreille's sections of his *Cara-*

* TAB. III. Fig. 3. g. *a*.

† What has been accounted by Fabricius and others as an additional or inner maxillary palpus is, strictly speaking, the outer or upper lobe of the maxillæ become palpiform. In *Staphylinus*, &c. this lobe is also *biarticulate* but not *palpiform*.

‡ TAB. III. Fig. 3. h. *a*. § The legs are made rather too long in the Figure.

bici

bici it bears the greatest affinity. Its depressed body, its elytra very obtuse at the tip or subtruncate with an *epipleura* dilated at the base, and its blunt anus, seem to indicate an approximation to *Lebia*, *Dromius*, &c., and the labial palpi are not unlike those of one sex in *Tarus* Clairv. (*Cymindis* Latr.) belonging to the same section; but its sessile head brings it nearer to *Scolytus* Fab., the labium of which is not very dissimilar, and to the aquatic *Entomophagi*. Its thorax is shaped very much like that of *Hydrophilus caraboides*. Its maxillary palpi are unlike those of any other entomophagous genus yet known. Many links, however, remain to be discovered before we can connect this remarkable and puzzling genus with any one at present known. In going over most of the cabinets in London I could discover nothing that came at all near this insect, which I purchased at the sale of the late Mr. Francillon's collection. From the mode in which it is transfixed, and the pin used, I suspect that it was taken by Mr. Abbot in Georgia.

excrucians. 1. P.

Tab. III. Fig. 3.

Long. corp. lin. 5.

Habitat in Georgiæ forsan aquaticis? Ex Mus. D. Francillon.

Corpus læve, nitidum, subpilosum, rufum. *Labrum* antice punctis quatuor excavatis setigeris. *Oculi* in medio pilosi. *Coleoptra* seriatim subpunctata, picea: margine externo rufo.

(*Melolonthidæ.*)

Mimela, *Kirby.*

Character Essentialis.

Mandibulæ dorso rotundatæ, apice compressæ bidentatæ: dente inferiori truncato. *Antennæ* novem-articulatæ.

Character

Character Artificialis.

Labium urceolatum, emarginatum.

Maxillæ apice sex-dentatæ, nempe 3. 2. 1.

Mandibulæ dorso rotundatæ, apice compressæ bidentatæ : dente inferiori truncato.

Labrum brevissimum, transversum, medio depresso-excavatum, vel emarginatum.

Antennæ novem-articulatæ.

Podex tectus.

Character Naturalis.

CORPUS ex oblongo obovatum, convexum, glabrum, alatum.

CAPUT ex triangulari subrotundum, declive. *Labrum* transversum, brevissimum, medio depressum, utrinque antice barbatum, verticale*. *Mandibulæ* basi subtriquetro-trigonæ, intus orbiculatæ transversim sulcatæ†, apice compressæ incurvæ bidentatæ : dente superiori obtuso, inferiori truncato subemarginato, dorso rotundato‡. *Maxillæ* validæ mandibulæformes, apice incurvæ sex-dentatæ, dentibus nempe 3. 2. 1.§ *Palpi maxillares* in nostris speciminibus desunt. *Labium* infra apicem et apud basin constrictum unde quasi urceolatum, apice emarginatum‖. *Palpi labiales* triarticulati : articulo primo minutissimo, intermedio subarcuato crassiori ; extimo ovato acuto¶. *Mentum* subquadratum**. *Antennæ* novem-articulatæ : articulo primo magno apice incrassato, quasi dolabriformi ; secundo brevi subturbinato ; proximis tribus subcylindricis ; sexto brevissimo fere pateræformi ;

* TAB. III. Fig. 4. a, *c*. † *Ibid.* c, *b*. ‡ *Ibid. a*. § *Ibid. d*. ‖ *Ibid.* b. ¶ *Ibid. a a*.

** *Ibid. c*. What is here called the *Labium* is often considered as the *Mentum* in this tribe ; but if comparison be made with *Carabus* L., it will be found, I think, that *c* in the figure rather represents the *Mentum*.

tribus

tribus ultimis elongatis pilosis, clavam elongatam linearilanceolatam formantibus*. *Oculi* subhemisphærici prominuli. *Septum* irregulare a naso per tertiam fere partem oculi transcurrit. *Nasus* s. *clypeus* transversus, distinctus, antice rotundatus, marginatus: margine reflexo†. *Rhinarium* verticale, brevissimum‡.

Truncus. *Thorax* transversus s. longitudine latior, tenuissime marginatus, antice angustior; sinu magno ad recipiendum caput exciso, postice obsolete trilobus: lobo intermedio rotundato, supra ad latera puncto ordinario impressus. *Prosternum* inter pedes anticos elevatum, compressum, apice dilatatum, oblique truncatum§. *Mesosternum* lineare, inter pedes intermedios latitans. *Metasternum* basi et apice mucronatum: mucrone postico bifido‖. *Scutellum* triangulare. *Coleoptra* oblonga, striata: striis duplicatis, podicem, excepto summo vertice, obtegentia. *Pedes* robusti: femoribus posticis incrassatis; tibiis anticis apice bidentatis¶: dente exteriori longiori obtuso; interiori brevi acuto; calcaribus 1. 2. 2. posticis obtusis**; tarsorum unguiculis simplicibus inflexis††.

Abdomen convexum: segmentis ventralibus sex; primo brevissimo; ultimo depresso obtuso.

The insect from which I have taken the characters of this genus I originally met with at a dealer's; and though it was transfixed with a needle, which seemed to indicate that it was

* Tab. III. Fig. 4. f. † *Ibid.* a, *a*.

‡ *Ibid. b.* I call the part, often conspicuous in this tribe, intervening between the nasus and the labrum, *Rhinarium*. § *Ibid.* i.

‖ *Ibid.* k. ¶ *Ibid.* g. ** *Ibid.* h, *a*. †† *Ibid.* l.

from

from China; yet as his insects were almost all of them Brazilian, and its general habit and aspect were that of a tropical American type, I concluded that it came from that country, and placed it in my cabinet along with my species of *Areoda* of MacLeay. Afterwards, being shown by a young lady a collection of undoubted Chinese insects, I found amongst them several specimens of *Mimela*, one of which she kindly gave me. Upon receiving this, on my return to Barham I set about a closer examination; and upon dissection I found, though many of its external characters seemed borrowed from South American types, yet that in those which were most essential, it came nearest to an Asiatic one, a well known species of which was abundant in China; and others have since been discovered in Java, and perhaps in Ceylon. I allude to Mr. W. S. MacLeay's genus *Euchlora*.

The Brazil genus, of which *Mimela* assumes the external appearance, is *Areoda* of the same learned author, who has observed with regard to *Euchlora*, "En genus Asiaticum *Areodæ* proximum*!" But that which I am describing still more nearly resembles it, wearing as it were its very habit; so much so, that at first sight it might almost be mistaken for a small specimen of *Areoda Leachii*. The general colour of the animal; the sculpture of the head, thorax and elytra; its distinct nasus or clypeus; its labium, labrum, maxillæ and legs, are all very similar. But in *Mimela*, as in *Euchlora*, the mandibulæ are concealed under the nasus; whereas in *Areoda* they are very visible, nor have they the dorsal process or tooth observable in the *Rutelidæ*. In the two former the antennæ consist of nine joints, in the latter of ten. In *them* the posterior lobe of the thorax is more obsolete than in *this*. In *Areoda* the last dorsal segment of the abdomen is not covered by the elytra; but in *Mimela* (a circum-

* *Horæ Entomolog.* 148.

stance

stance in which it agrees with *Pelidnota* MacLeay, another South American type,) only the tip is uncovered. The latter, *Mimela*, has an elevated prosternum, and a metasternum with a very short anterior mucro, so as to leave the mesosternum visible; whereas in the former, *Areoda*, the prosternum is not visible without dissection, and the anterior mucro of the metasternum is elongated so as entirely to cover and conceal the mesosternum. The abdomen also in *Areoda* is covered underneath with an infinity of very minute punctula, which give it a silky appearance; whereas in *Mimela*, and likewise *Pelidnota*, it is lævigated.

Though *Mimela* agrees in most of its essential characters with *Euchlora*, it differs sufficiently to form at least a *subgenus* in a modern system. In the former the mandibulæ have only two teeth at their apex; in the latter they have three. In *this* also the body is covered with innumerable impressed puncta of the same size; whereas in *that* the puncta are of two sizes, the larger scattered, the smaller almost invisible and quite covering the surface. In *Euchlora* the last dorsal segment of the abdomen and part of the last but one are uncovered, the very reverse of which, as we have seen, takes place in *Mimela*. Whether the inner claw of the four anterior legs is bifid at the apex in the latter as it is in the former I cannot say, these tarsi being mutilated in my specimens.

I shall here mention one very remarkable circumstance, noticed by no writer that I have met with, which distinguishes the mandibulæ of the tribes of *Melolontha* F., though less conspicuous in *Melolontha* itself than in the *Euchlora*, *Rutelidæ*, *Anoplognathidæ*, *Chalepus*, &c. The *molary* part, or that which appears destined to comminute the food, is an orbicular or subquadrate flat plate at the inner base of the mandibles, scored out into numerous alternate transverse ridges and fur-

rows*. When the mandibles are open, the food, after it has been divided by their apex, must pass between these plates, which, supposing that the ridges of one mandible are received by the furrows of the other, as is most probably the case, must have vast force in comminuting the food, not so much by the friction of the plates, since that could scarcely take place in consequence of the above structure, but from their pressure and the action of the sharp ridges. The mandibula indeed is particularly fitted for this double office, the upper part being thin and adapted to cutting†, and the base vastly thick and strong, as if its office was great pressure‡. At the base of the mandible in the genus before us, but not in all, there are other short furrows forming an acute angle with the transverse ones and opening into the gullet. In the *Dynastidæ* MacLeay, the molary space is visible, but is smaller, and has fewer furrows. In *Dynastes Enema* it has only two obtuse ridges and as many furrows, and appears evidently calculated to masticate, but more grossly, a harder substance than what is submitted to the action of the mandibles of *Melolontha* F. In a specimen of *Areoda* I found adhering to this molary plate a substance resembling the pollen of flowers, which may hence be conjectured to be the food of that genus§.

From this account it seems I think evident, that a modification of the three kinds of teeth of vertebrate animals is to be found in these tribes as well as the *Orthoptera*, in which Marcelle de Serres detected them; for we find the *incisores* at the apex of the mandible, the *molares* at its base, and the *laniarii* at the apex of

* TAB. III. Fig. 4. c, *b*. † *Ibid. a*. ‡ *Ibid. b*. right hand figure.

§ Since this paper was written, I met accidentally with a passage in Cuvier's *Anatomie Comparée* (iii. 321—.), by which it appears that he had observed in the mandibles of the larvæ of the *Lucani* "*vers leur base, une surface molaire plane et striée;*" but he does not appear to have noticed this structure in any perfect insect.

the

the maxillæ*: though with respect to these last, I believe their primary use in very many insects is to hold the food for the action of the mandibulæ.

MIMELA CHINENSIS.

TAB. III. Fig. 4.

Long. corp. lin. 9.

Habitat in China. Ex Mus. D^nae^ Crane.

Corpus glaberrimum, luteo-virens, colore sub luce mutabili, subtus cupreo tinctum. *Caput* supra antice punctis confluentibus rugulosum, postice punctis sparsis conspersum, interque puncta creberrima minutissima, vix sine lente forti conspicua, subtus fulvum. *Antennæ* fulvæ. *Thorax* punctis sparsis punctulis minutissimis interjacentibus ut in capite. *Elytra* subrugosa, puncto-striata: striis intermediis per paria ordinatis, interstitiis punctatis et punctulatissimis ut in thorace, &c., apice gibba.

The insect I shall now describe is of a different order: and though it does not so strikingly assume the characters of another tribe or genus; yet, as it appears to partake of those of both *Agrion* and *Lestes*, exhibiting the general appearance and wings of the former, with some diagnostics of the latter, it seems not improperly introduced.

AGRION BRIGHTWELLI.

Nigrum: alis basi, in altero sexu apice macula, sanguineis.

TAB. III. Fig. 5.

Long. corp. unc. $2\frac{1}{4}$.

Expans. alar. unc. $2\frac{3}{4}$.

Habitat in Brasilia. Ex Mus. D. Brightwell.

* TAB. III. Fig. 4. d.

Corpus nigrum, sub sole splendore obscure metallico subnitens. *Caput* subpilosum. *Truncus* brunneo-niger, supra lineis tribus longitudinalibus, intermedio elevato, nigris, sub alis primoribus strigis tribus obliquis, superiori obsoletiori, pallidis. *Alæ* subhyalinæ, basi læte sanguineæ, posticis apice macula subrotunda ejusdem coloris. *Stigma* nigrum oblongo-quadratum. *Abdomen* elongatum, tenue, transversim rugulosum, basi et apice subincrassatum. *Forceps* analis rectus? inferiori subincurvo.

N. B. In quibusdam speciminibus macula rotunda sanguinea alas primores item apice ornat. An sexûs varietas?

Nomen dedi in honorem D. Brightwell *Norvicensis, insectorum collectoris indefessi, felicis; indagatoris acuti, docti.*

The upper anal forceps in the specimens of this insect that I have had an opportunity of examining were mutilated; I cannot therefore be positive that it does not approach nearer to *Lestes* of Dr. Leach, the stigma of which its wings exhibit, than to *Agrion*; but as these last are not suddenly narrower at their base, as in the *former* genus, I have considered it as belonging to the *latter*.

EXPLA-

EXPLANATION OF THE FIGURES IN TAB. III.

Fig. 1. *Catascopus Hardwickii* and its details.
- a. The Labrum.
- b. The Labium. *aa*. Labial Palpi. *bb*. Exterior lobe of Labium. *c*. Intermediate ditto.
- c. The Mandible.
- d. The Maxilla. *a*. The Base. *b*. The Apex. *c*. Exterior maxillary Palpus.
- e. The Mentum.
- f. The Antenna.
- g. The anterior Tibia. *a*. The Notch.

2. Details of *Notiophilus* Leach. Roman and italic letters refer to the same parts as in Fig. 1.
3. *Heteromorpha excrucians.*
- a. The Labrum.
- b. The Labium. *aa*. Labial Palpi. *bb*. Exterior lobe of Labium. *c*. Intermediate ditto.
- c. The Mandible.
- d. The Maxilla. *a*. The Base. *b*. The Apex. *c*. Exterior maxillary Palpus.
- e. The Mentum.
- f. The Antenna.
- g. The anterior Tibia. *a*. The Notch.
- h. Posterior Leg. *a*. Trochanter, acting as a fulcrum to the thigh.

4. *Mimela chinensis* and its details.
- a. Portion of the anterior part of the Head. *a*. The Nasus. *b*. The Rhinarium. *c*. The Labrum.
- b. The Labium and Mentum. *aa*. Labial Palpi. *b*. Labium. *c*. Mentum.

Fig.

Fig. 4. cc. Different views of the Mandibulæ. *c*. Interior face of ditto. *a*. Apex. *b*. Base, or orbicular transversely-sulcated Mola.

c. Lateral view of Mandible.

d. The Maxilla. *a*. The Base. *b*. The Apex. *c*. Exterior maxillary Palpus.

e. The Mentum.

f. The Antenna.

g. Portion of anterior Tibia. *a*. Its two Teeth.

h. ——— of posterior ditto. *a*. Its Calcaria.

i. Prosternum.

k. Metasternum. *a*. Anterior Mucro, looking to the Head.

b. Posterior ditto, looking to the Anus. *cc*. Posterior Coxæ.

l. Last joint of posterior Tarsus, to show the Claw.

5. *Agrion Brightwelli.*

VI. *Some*

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VI. *Some Account of a new Species of* Eulophus *Geoffroy.* *By the Rev. William Kirby, M.A. F.R.S. and L.S.*

Read December 17, 1822.

Having had an opportunity of observing some part of the proceedings of a new species of that singular tribe of parasitic *Hymenoptera*, of which Geoffroy, on account of the branched antennæ of the male, has constituted a genus under the name of *Eulophus*, I flatter myself that the observations I have made will not be unacceptable to the Linnean Society.

Geoffroy's original species (*E. pectinicornis*) was found by him upon the leaves of the lime-tree*; but De Geer obtained it from the caterpillar, which it infests, that namely of a *Bombyx* related to *B. Anastomosis*†. The same illustrious entomologist, from a little subcutaneous larva, which mines its tortuous galleries in the leaf of the oak, procured a second species (*E. ramicornis*)‡. That which I am about to describe consoled me for my disappointment in not bringing to perfection a caterpillar which I found upon the hazel, and which nearly, but not altogether, resembled that of *Bombyx camelina*. This caterpillar, which I took on the twelfth of last July, had sixteen legs, the membranaceous ones or prolegs being armed with a semi-coronet of hooks. It was green, with two lateral pale-yellow longitudinal stripes, the spiracles or breathing-pores being in the lower one. On its last segment but two, which was gibbous, it was armed with

* *Hist. Ins. Par.* ii. 313. † *Mem. &c.* ii. 319. *t.* iv. *f.* 22—24. ‡ *Ibid.* i. 588.

a pair

a pair of rose-coloured rather hairy horns or papillæ. On each segment of the body was a transverse series of longish black hairs.

On the 19th of the same month, seventeen parasitic larvæ broke forth from my caterpillar. They were of a conical shape, and resembled those which De Geer found upon the horse-chesnut*, the head being truncated and the other end acute. They were of a pale-green colour, and, like those of De Geer, besmeared with a kind of varnish or gluten, by which they were enabled to adhere to the lid of the box the caterpillar was in, around the exuviæ of which they arranged themselves. Previously to their becoming pupæ they voided all their excrement in the form of little oval pea-green grains, seven or eight in number, which remained fixed at a little distance from them. About the 23rd they had assumed the pupa, which was of the angular kind, and from green had changed to a ferruginous or reddish-brown colour. On the first of August the fly appeared, when, being suddenly called from home, I had not time to attend to it further than to wrap up the box carefully in paper to prevent their escape. On my return ten days afterwards I found, however, that four had contrived to get out; for all the pupæ, their cases remaining fixed to the lid of the box, had produced flies, and I could discover only thirteen, all of which were dead, namely, twelve females and one male. I shall now describe my little fly.

EULOPHUS DAMICORNIS.

Aureo-viridis: abdomine nigricanti, basi macula pallida subpellucida.

Long. corp. lin. $1\frac{1}{4}$.

Habitat in larva *Bombycis camelinæ?* Mus. nostr.

* *Mem. &c.* ii. 890—. *t.* xxxi. *f.* 1—5.

MAS.

MAS.

Corpus oblongum, subpilosum, colore aureo-viridi sericeum, punctulis elevatis minutissimis, nisi sub lente forti omnino inconspicuis, granulatum et quasi reticulatum. *Caput* triangulare, verticale. *Oculi* laterales, nigri, subhemisphærici. *Antennæ* thorace breviores, exalbidæ, octo-articulatæ: articulo primo minutissimo obconico; secundo incrassato sequentibus longiori flavescenti; tertio minuto obconico; proximis tribus filiformibus, ramum elongatum filiformem exarticulatum pilosissimum e basi emittentibus; septimo elliptico; extimo ovato acuto. *Truncus* subovatus. *Mesothorax* subrhomboidalis. *Metathorax* declivis: scutello suborbiculato; postscutello? transverso. *Alæ superiores* albæ aveniæ: costa infra apicem ramulum divergentem emittente, pilis brevissimis decumbentibus nigris quasi reticulatæ, *inferiores* semilanceolatæ, iricolores, aveniæ. *Pedes* albi: tarsis apice summo nigris. *Abdomen* subobcuneatum, depressum, nigro-violaceum, basi macula transversa subpellucida alba: ano mucronato; mucrone apice rotundato, macula alba.

FŒMINA.

Mari simillima, sed *antennæ* simplices: articulis tribus intermediis oblongis; duobus ultimis subdistinctis; extimo brevi unico. *Femora postica* extus apice nigricantia. *Anus* inermis.

This species is very similar to *E. ramicornis* (of which as well as of *E. pectinicornis* I possess British specimens), the principal distinction being the white spot in the base of the abdomen.

VII. *Account of the Lansium and some other Genera of Malayan Plants. By William Jack, M.D. Communicated by Henry Thomas Colebrooke, Esq. F.R.S. and L.S.*

Read January 21, 1823.

THERE are a variety of highly esteemed fruits, which may be considered as peculiar to the Malayan Archipelago, or what has been not unaptly denominated *India aquosa*, and are not to be found beyond its limits. Many of these are already well known; but there are others which have not yet fallen under the observation of botanists, or are only to be found described in the *Hortus Amboinensis* of Rumphius, which, though a work of wonderful accuracy and research, stands in need of illustration with reference to the progress that has been made in botanical science since the period at which it was written. Among these the *Lanseh*, the *Tampooi*, and the *Choopa* hold no undistinguished place, and the following account of these plants will therefore not be uninteresting. The first is already partially known from Rumphius, and Mr. Marsden's *History of Sumatra*, but its true place and family have hitherto remained doubtful. To these I have subjoined descriptions of a few other genera from the same interesting quarter, which appear to be new and to deserve notice.

LANSIUM.

LANSIUM.

Decandria Monogynia. N. O. Meliaceæ Juss.

Calyx 5-partitus. *Corolla* 5-petala, petalis subrotundis. *Tubus staminiferus* globosus, ore subintegro, antheris decem inclusis. *Ovarium* 5-loculare, loculis 1—2-sporis. *Stylus* brevis, columnaris. *Stigma* planum, 5-radiatum. *Bacca* corticata, 5-locularis, 5-sperma, uno alterove loculo tantum semen perficiente. *Semina* integumento exteriore pulposo sapido. *Albumen nullum*; *cotyledonibus inæqualibus peltatis.*

Arbores, foliis pinnatis, floribus racemosis.

LANSIUM DOMESTICUM.

Langsat or Lanséh. *Malay.*
Lansium. *Rumph. Amb.* i. *p.* 151. *t.* 54.
Marsden's *Hist. of Sumatra, pl.* v. *p.* 101.
Native of the Malay Islands.

A moderate-sized tree. *Branchlets* tomentose. *Leaves* alternate, pinnate; leaflets from seven to nine, alternate, short, pedicelled, elliptic-oblong, broader above, rounded towards the point, and terminating in an obtuse acumen, entire, very smooth; nerves pubescent beneath; from seven to ten inches long. The young leaves are pubescent on the under surface. *Stipules* none. *Racemes* springing from the trunk and naked branches, sometimes solitary, sometimes fascicled, at first suberect, but drooping afterwards by the weight of the fruit; tomentose: flowers sessile, alternate, solitary, tribracteate at the base. *Calyx* deeply five-parted; segments round, concave, imbricated. *Corolla* five-petalled, yellowish, a little longer than the calyx; petals subrotund. *Staminiferous tube* sub-globose; mouth nearly entire; anthers

thers ten, inserted within the tube. *Ovary* five-celled; cells containing a single or double ovulum attached above to the inner angle. I have never observed two distinct ovula; but the single one is often marked with a furrow, as if composed of two united together. *Style* short, thick, columnar, ten-furrowed. *Stigma* flat, obscurely radiated. *Berry* of a yellowish colour, cortical, seated on the persistent calyx, oblong-ovate, or oval, slightly tomentose, five-celled, five-seeded. *Seeds* enveloped in a white semi-transparent pulpy tunic or aril, exalbuminous; cotyledons solid, conform to the seed, unequal, irregularly transverse, peltate; the short pilose radicle being inserted into their centre. Two seeds are frequently contained in one common integument, so firmly united as to appear but one, until by dissection the two radicles and four irregular cotyledons are discovered. There are seldom more than one or two cells in each fruit that perfect their seed; the others are only filled with the white transparent pulp.

Var. *β*. *L. aqueum*.

Foliolis subtus villosis, racemis densis sæpius solitariis, fructibus globosis.

Ayer Ayer. *Malay*.

The Ayer Ayer so nearly resembles the Lanséh in most particulars, that I hesitate to rank it as a distinct species, and content myself with mentioning it as a permanent and well-marked variety. They are principally distinguished by the Malays by their fruit, that of the Ayer Ayer being rounder, and the pulp more watery (whence the name), and dissolving more completely in the mouth than that of the Lanséh. Both are highly esteemed by the Malays, and are equally agreeable to the European palate.

The

The juicy envelope of the seeds is the part eaten, and the taste is cooling and pleasant.

This genus has hitherto been known only from Rumphius's figure and description, and its place in the system has therefore continued uncertain. From an examination of the fruit, M. Correa de Serra conjectured it to be intermediate between the families of *Aurantiæ* and *Guttiferæ*, but the structure of the flower determines its true place to be among the *Meliaceæ*.

I have further met in the forests near Bencoolen with a tree which appears to agree very nearly with the *Lansium montanum Rumph. Amb.* i. *p.* 154. *t.* 56. It differs in the number of the stamens, styles and seeds from the *Lansium* described above, but agrees with it exactly in carpological structure and in general habit. Its characters coincide very nearly with those of Roxburgh's *Milnea*. They are as follow:

Flowers small and inconspicuous. *Calyx* five-parted. *Corolla* five-petalled. *Stamineous tube* subglobose, entire at the mouth; anthers five, within the tube. *Styles* two. *Stigmas* two, simple. *Berries* globose, about the size of the domestic Lanséh, 1—2-celled, 1—2-seeded. *Seeds* enveloped in a thin subtransparent pulpy tunic or envelope, which has somewhat the flavour of the Lanséh, but with a bitterish and rather disagreeable smell. Carpology as in the *L. domesticum*.

The leaves are pinnate with about seven leaflets, elliptic-oblong, broader above and narrowing to the base, terminating in a long obtuse acumen, entire, very smooth. *Petioles* sprinkled as well as the branchlets with ferruginous pulverulent tomentum. *Stipules* none. *Panicles* axillary or supra-axillary, shorter than the leaves, composed of a few short branches with small greenish flowers.

Milnea

Milnea is perhaps scarcely distinct from *Lansium;* but if admitted as a separate genus, the above will constitute a second species, differing from *M. edulis* Roxb. in being digynous, and may be denominated *M. montana.*

HEDYCARPUS.

Tetrandria Monogynia.

Perianthium 4-partitum, inferum. *Stamina* 4. *Ovarium* 3-loculare, loculis disporis. *Stigmata* tria. *Capsula* baccata, 3-valvis, 3-locularis, seminibus arillo sapido tunicatis. *Embryo inversus, albumine inclusus. Arbor foliis alternis simplicibus, floribus racemosis.*

The stamens are occasionally five in number, with a five-parted perianth and four-celled ovary.

HEDYCARPUS MALAYANUS.

Bera Tampui. *Malay.*
Sumatra.

A small tree. *Branchlets* smooth. *Leaves* alternate, petiolate, broad-ovate, rounded at the base, acuminate, nearly entire, with recurved edges, sometimes obsoletely crenulate, very smooth, deep green and shining above, and paler beneath, strongly nerved; from nine to ten inches long. *Petioles* thickened at both ends, from two to two inches and a half long. *Stipules* ovate, acute, deciduous. *Racemes* principally from the trunk and larger branches, but sometimes axillary, fascicled or solitary, straight, from two to three inches long; pedicels supporting several flowers, tomentose. *Bracts* on the pedicel below its subdivision, small, broad. *Perianth* small, yellowish, villous, somewhat fleshy, four-, some-

sometimes five-parted; segments narrow. *Stamens* four, sometimes five, alternate with the segments of the perianth, short; anthers roundish, two-lobed. *Ovary* small, three-, sometimes four-celled; each cell containing two ovula attached to the inner angle. *Style* scarce any. *Stigmas* three, sometimes four, fleshy, villous. *Fruit* about the size of a China orange, with a thick rough rind, three-valved, three-celled; cells generally two-seeded, partitions opposite to the valves. *Seeds* enveloped in a white juicy aril, as in the *Lansium*, &c. *Embryo* contained in an ample albumen inverse. *Cotyledons* flat, foliaceous, cordate, subrotund. *Radicle* superior, short, clavate.

Obs. This is a fruit which ranks in point of taste and flavour along with the Lanséh, &c., but is by no means so frequently met with. The genus is most nearly allied to *Pierardia* of Roxburgh, with which it agrees in general habit, in foliage, in the mode of inflorescence, and in the structure of the seeds, but differs in having a valvular fruit and in the number of the stamens. The following description of the Choopa, another highly esteemed Malayan fruit, which belongs to *Pierardia*, will illustrate the affinity between these two genera.

PIERARDIA. *Roxb.*

Perianthium 4-partitum. *Stamina* octo, brevia. *Ovarium* 3-loculare, loculis disporis. *Stigma* trifidum. *Bacca* corticata, trilocularis, loculis 1—2-spermis. *Semina* arillo sapido tunicata. *Embryo* inversus albumine inclusus.

Arbores, floribus racemosis, foliis alternis simplicibus.

Pierardia

PIERARDIA DULCIS.

Monoica, foliis obovatis.

Bua Choopa. *Malay.*

Sumatra.

This is a middle-sized tree. *Leaves* crowded at the ends of the branches, alternate, petiolate, obovate, or elliptic-obovate, rounded at the top, with a short blunt acumen, entire, smooth, flat; from eight to nine inches long. *Petioles* thickened and jointed above and below. *Stipules* ovate, deciduous. *Racemes* from the naked branches. Male and female flowers in distinct racemes; in the former the pedicels are generally three-flowered; in the latter one-flowered. *Bracts* small.

MALE. *Perianth* four-parted, spreading, yellowish, tomentose within, very slightly so without. *Stamens* eight; *filaments* very short; *anthers* two-lobed. *Ovary* abortive.

FEMALE. *Perianth* considerably larger than in the male, divided to the base into four long thick lobes; sometimes there is a fifth. *Stamens* none. *Ovary* subglobose, three-celled; cells two-sporous. *Style* one. *Stigmas* three, spreading, fleshy, hispid. *Berry* subglobose, larger than a cherry, of a yellowish colour, three-celled; cells generally one-seeded. *Seeds* enveloped in a white pulpy aril or tunic. The embryo is inverse, with flat cotyledons in the centre of an ample albumen.

OBS. This species differs from that described by Roxburgh in being monoecious, in the form of the leaves, and in the colour of the fleshy aril. The Rambeh, of which Mr. Marsden has given a figure in his *History of Sumatra*, *pl.* vi. *p.* 101. so nearly resembles this, that I think it can only be a variety of the same. The Rambeh belongs to the peninsula

sula of Malacca, and is unknown at Bencoolen; while the Choopa, which is abundant at the latter place, is not found in the former. The racemes of the Rambeh are longer and the fruit smaller than in the Choopa; but a comparison and examination of the two would be necessary to ascertain whether there are any essential differences, and I have not had an opportunity of doing this.

LEUCONOTIS.

Tetrandria Monogynia. N.O. Apocineæ. Br.

Calyx inferus, 4-partitus. *Corolla* tubulosa, superne angustior, limbo 4-lobo. *Stamina* 4, inclusa, laciniis corolla alterna. *Ovarium* simplex, biloculare, loculis disporis. *Stylus* 1, brevis. *Stigma* annulatum, apice conico. *Bacca* 1—3-sperma. *Semina* exalbuminosa, embryone inverso.

Frutex lactescens, foliis oppositis exstipularibus, floribus dichotome corymbosis axillaribus.

Leuconotis anceps.

Akar Morai. *Malay.*
Sumatra.

A large shrub. *Branchlets* four-sided, sprinkled with elevated dots. *Leaves* opposite, petiolate, oblong, rounded at the base, rather long-acuminate, entire, a little waved at the edge, very smooth, shining above, paler and sprinkled with elevated dots beneath; nerves connected by submarginal arches; about four inches long. *Petioles* about an inch in length, carinate, connected by a ridge. *Stipules* none. *Peduncles* axillary, two-edged, longer than the petioles, bearing a dichotomous corymb of yellow flowers. *Bracts* small, acute,

acute, broad at the base. *Calyx* erect, four-parted, segments rather obtuse, margins membranaceous. *Corolla*, tube long, gibbous at the base, narrowing upwards; lobes of the limb ovate. *Stamens* four, inserted on the middle of the tube, incluse; *filaments* very short; *anthers* long, linear, subsagittate at the base. *Style* reaching to the insertion of the stamens. *Stigma* conical, with a prominent ring. *Berry* superior, ovate, somewhat flattened at the base, smooth, marked near the point with four prominent lines, containing from one to three seeds, the fourth generally abortive; when cut it exudes a great deal of milky juice. *Seed* elliptic-oblong, exalbuminous. *Embryo* inverse, conform to the seed. *Cotyledons* plano-convex, the plane sides having a reciprocal concavity and convexity, and being a little crisped towards the edges; they are deeply cordate above, the auriculate lobes overlapping each other. *Radicle* superior, oblong.

OBS. This singular plant belongs without doubt to the family of the *Apocyneæ*, with which its general appearance and habit entirely correspond. It agrees with *Cerbera* in having exalbuminous seeds; but its ovary is simple like that of *Carissa;* it will therefore hold an intermediate place between these two genera.

MYRMECODIA.

Tetrandria Monogynia. N. O. Rubiaceæ.

Calyx subinteger. *Corolla* quadrifida tubo intus ad insertionem staminum piloso. *Stamina* quatuor, corollâ breviora. *Stylus* staminibus longior. *Stigma* simplex. *Bacca* ovata, quadrilocularis, tetrasperma.

Parasitica basi tuberosa, flores basibus petiolorum semitecti.

MYRME-

MYRMECODIA TUBEROSA.

Nidus germinans formicarum rubrarum. *Rumph. Amb.* vi. *p.* 119. *t.* 55. *fig.* 2.

Found at Pulo Nias.

This singular plant is found parasitic upon old trees, in the form of a large irregular tuber, from which arise a few thick, short, fleshy branches. The *Leaves* are crowded at the rounded extremities of these branches, and are opposite, petiolate, obovate-oblong, with a short acumen, attenuated to the petiole, entire, very smooth, somewhat leathery. *Petioles* long, roundish, inserted on a large persistent peltate knob, whose edges expand into a kind of stipule, ciliated along the margin with dense strigose fibres, and cleft above in the axil of the petiole. The *flowers* are sessile, closely disposed in the spaces between the stipular bases of the petioles and half concealed under their projecting edges. *Calyx* membranaceous, superior, nearly entire. *Corolla* white, tubular, quadrifid; segments erect, rather acute; a villous ring within the tube immediately below the insertion of the stamens. *Stamens* four, shorter than the corolla, and alternate with its segments; *anthers* white, two-celled. *Style* longer than the stamens. *Stigma* simple, tomentose. *Ovary* four-celled, four-seeded. *Berry* ovate, smooth, white with longitudinal lines, four-celled, four-seeded. *Seeds* furnished with albumen; *embryo* in its axis.

OBS. There can be no doubt of this being the plant described by Rumphius, although the leaves are represented more acute in his figure than they are in my specimens.

HYDNOPHYTUM.

Tetrandria Monogynia. N. O. Rubiaceæ. Juss.

Calyx integer. *Corolla* limbo 4-fido, fauce pilosâ. *Stamina* 4, brevia, fauci inserta. *Stigma* bifidum. *Bacca* disperma.

Super arbores parasitica, basi tuberosa, floribus axillaribus.

HYDNOPHYTUM FORMICARUM.

Nidus germinans formicarum nigrarum. *Rumph. Amb.* vi. *p.* 119. *t.* 55. *fig.* 1.

Prio Hantu. *Malay.*

On trees in the forests of Sumatra.

This grows parasitic on trees in the form of a large irregular tuber, fastening itself to them by fibrous roots, and throwing out several branches above. The tuber is generally inhabited by ants, and hollowed by them into numerous winding passages, which frequently extend a good way along the branches also, giving them the appearance of being fistular. *Leaves* opposite, short-petioled, elliptic-obovate, nearly obtuse, acute at the base, very entire, very smooth, thick, with the midrib flattened, and a few inconspicuous nerves. *Stipules* interpetiolar, linear. *Flowers* axillary, sessile, generally aggregated on a double gemmaceous knob. *Calyx* superior, very short, entire. *Corolla* white, tubular; *limb* four-cleft; *faux* villous. *Stamens* alternate with the segments of the corolla; *filaments* scarce any. *Ovary* crowned with a prominent umbilicate disk, disporous. *Style* longer than the tube. *Stigma* of two revolute linear thick lobes. *Berry* of a semipellucid reddish-yellow colour, ovate-oblong, two-seeded. *Seeds* oblong, contained in a tough integument, with the embryo in the axis of the albumen.

OBS.

Obs. I am not aware that these two plants have been described by any botanist since the time of Rumphius, or that any conjecture has been made regarding their place and family from his figure or description. From their common habit as parasites, I should have been much inclined to place them under one genus; but the different number of seeds in each, supported by the difference of a simple and bifid stigma, seems to oppose this, while the distinction is further confirmed by the different disposition and insertion of the leaves, which in *Hydnophytum* are arranged precisely as usual in the *Rubiaceæ*, but in *Myrmecodia* are crowded round the thick fleshy branches in such a manner, that their being really opposite is not immediately apparent, while their insertion on their broad peltate bases is further peculiar.

LASIANTHUS.

Rubiaceæ. Juss.

Calyx 4-partitus, laciniis linearibus. *Corolla* infundibuliformis, pilosa. *Stamina* 4. *Stigmata* 4, linearia, crassa. *Bacca* tetrapyrena.

Suffrutices, floribus axillaribus, bracteis oppositis, baccis cyaneis.

Lasianthus cyanocarpus.

Villosus, bracteis magnis cordatis.

Found at Tappanooly on the west coast of Sumatra.

Stem herbaceous or suffrutescent, erect, round, villous. *Leaves* opposite, petiolate, oblong-lanceolate, acute, entire, villous; three or three inches and a half long. *Petioles* short. *Stipules* interpetiolar, acute. *Flowers* generally three in each axil, nearly sessile, supported by two large opposite cordate bracts. *Calyx* superior, four-, sometimes five-parted; laciniæ linear, acute, pilose. *Corolla* yellow, tubular, funnel-shaped,

shaped, pilose both externally and internally. *Stamens* four, sometimes five; *anthers* oblong. *Ovary* crowned by a nectarial ring, four-sporous. *Style* as long as the stamens. *Stigma* of four thick linear divisions. *Berry* as large as a small gooseberry, of a transparent azure blue, pilose, its flesh spongy or farinose, containing four nuts or hard seeds.

LASIANTHUS ATTENUATUS.

Villosus, foliis supra glabris, bracteis lanceolatis.
Found in the interior of Bencoolen.

Suffrutescent, erect. *Branches* alternate, long, spreading, round, villous. *Leaves* opposite, sub-bifarious and somewhat drooping, short-petioled, oblong, attenuated to the point, rounded or subcordate, and sometimes a little unequal at the base, nearly entire, but sometimes waved or obsoletely dentate on the margin; smooth above, except on the nerves, which are pilose; softly villous beneath; from three to four inches long by about one broad. *Petioles* very short, villous. *Stipules* interpetiolar, acuminate, villous. *Flowers* axillary; nearly sessile, from three to four in each axil. *Bracts* two, opposite, lanceolate, acute, villous. *Calyx* four-parted, villous; segments linear, acute. *Corolla* yellow, tubular, pilose both within and without; limb four-parted. *Stamens* four; *filaments* short; *anthers* oblong, two-celled. *Ovary* pilose, crowned within the calyx by a prominent nectarial ring, four-sporous. *Style* one. *Stigma* of four thick linear divisions. *Berry* pilose, ovate, crowned with the calyx, smaller than in the preceding, becoming dyed of a dark blue, of which colour the hairs also partake, containing four one-seeded nuts. *Embryo* cylindrical, in the axis of the albumen.

HELO-

HELOSPORA.

Tetrandria Monogynia. Linn. *Rubiaceæ.* Juss.

Calyx 4-dentatus. *Corolla* tubulosa, limbo 4-partito. *Stamina* inclusa. *Stylus* 4-sulcus, apice 4-fidus. *Stigmata* quatuor. *Bacca* calyce coronata, polysperma, seminibus duplici serie cruciatim dispositis, nidulantibus, linearibus, parum curvis.

Arborescens, glabra, pedunculis axillaribus unifloris, æstivatione valvata.

Helospora flavescens.

Native of Sumatra.

A small tree. *Leaves* opposite, short-petioled, ovate-lanceolate, acuminate, very smooth, entire: from three to five inches long. *Stipules* interpetiolar, deciduous, acute; a line of ciliary hairs within them. *Peduncles* axillary, solitary, one-flowered, shorter than the leaves. *Bracts* two, small, at the base of the ovary. *Calyx* superior, erect, four-toothed, persistent. *Corolla* yellow, tube much longer than the calyx; mouth naked; limb four-parted, spreading; segments oblong. *Æstivation* valvate. *Stamens* four, within the tube; *filaments* scarce any; *anthers* linear, obtuse, flattened, two-celled. *Ovary* subglobose, four-lobed, crowned by a nectarial ring or disk, polysporous, not divided into cells, but having the ovula implanted in its substance and arranged in double lines in the form of a cross. *Style* composed of four connate threads, which diverge at top, somewhat longer than the tube. *Stigmas* four. *Berry* globose, with four rounded angles and furrowed between, crowned with the calyx, many-seeded. *Seeds* long, linear, inserted perpendicularly, and cruciately arranged in four double lines corresponding to the angles or lobes of the fruit.

Obs.

OBS. The disposition of the seeds in this genus is very peculiar, and forms a good distinctive character.

GLAPHYRIA.

Icosandria Monogynia. N.O. Myrtaceæ.

Calyx superus, quinquefidus. *Corolla* pentapetala. *Bacca* quinque-locularis, polysperma; singuli loculi semina duplici ordine axi affixa.

Arbusculæ, foliis alternis, floribus axillaribus.

GLAPHYRIA NITIDA.

Foliis obovatis obtusis.

Found on the summit of Gunong Bunko, or the Sugarloaf Mountain, in the interior of Bencoolen.

A small branchy tree, with very smooth reddish branchlets. *Leaves* alternate, short-petioled, obovate, obtuse, very entire; three-fourths of an inch or an inch long, very smooth and polished, very firm, coriaceous, shining-green above, pale and whitish beneath with depressed dots, almost veinless, the lateral nerves indistinct and not at all elevated. *Petioles* short, reddish. *Stipules* minute. *Peduncles* axillary, solitary, few-flowered; *pedicels* alternate, rather long. *Bracts* deciduous. *Calyx* superior, persistent, five-parted; *segments* oblong. *Corolla* five-petalled. *Stamens* numerous. *Ovary* five-celled, polysporous, crowned with a nectarial tomentose disk. *Style* one. *Berry* about the size of a pea, five-celled, many-seeded. *Seeds* arranged in a double series in each cell, attached to the axis.

OBS. This is a very handsome shrub, having much the habit and foliage of the common Myrtle, but the leaves are smaller and firmer. Its character and appearance are alpine, and it

is

is only met with at high elevations; I found it on the summit of the Sugarloaf, and I am informed that it is almost the only shrub met with towards the top of the volcanic cone of Gunong Dempo in Passumah, where it is called *Kayo Umur panjang*, or the Tree of long Life, probably from its maintaining itself at elevations where the other denizens of the forest have ceased to exist. At Bencoolen an infusion of the leaves is drunk as a substitute for tea; and it is known to the natives by the name of the Tea Plant.

GLAPHYRIA SERICEA.

Foliis lanceolatis acuminatis.

Found on Pulo Penang, an island on the western coast of Sumatra.

This is a moderate-sized tree; its leaves are lanceolate, long-acuminate, entire, very smooth. *Flowers* few, on short leafy peduncles or branchlets, which spring from the axils of the upper leaves. The calyx, peduncles and bracteolar leaflets are sericeous, as also the young leaves and shoots. *Corolla* from five- to six-petalled. *Stamens* numerous. *Ovary* from five- to six-celled, polysporous.

EXPLANATION OF THE FIGURES IN TAB. IV.

Fig. 1. *Lansium domesticum*.

a. The flower.

b. The same in front.

c. The stamineous tube.

d. The same laid open and expanded.

e. The ovary.

f. A section of the same.

Fig. 1. *g*. The fruit.
h. Transverse section of the same.
i. A double seed.
k. The same separated, showing the four cotyledons and two radicles.
l. A single seed.
m. The cotyledons separated.

Fig. 2. *Leuconotis anceps*.
a. The flower.
b. The corolla laid open.
c. The ovary and style.
d. Transverse section of the same.
e. The fruit.
f. Transverse section of a fruit containing three seeds.
g. Ditto containing a single seed.
h. A seed.
i. The cotyledon externally.
k. The same internally with the radicle.

Fig. 3. *Helospora flavescens*.
a. The flower.
b. The corolla laid open.
c. An anther enlarged.
d. The pistil.
e. The fruit; a transverse section.
f. A seed.

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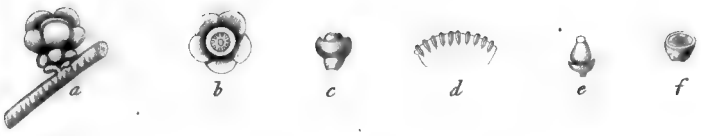

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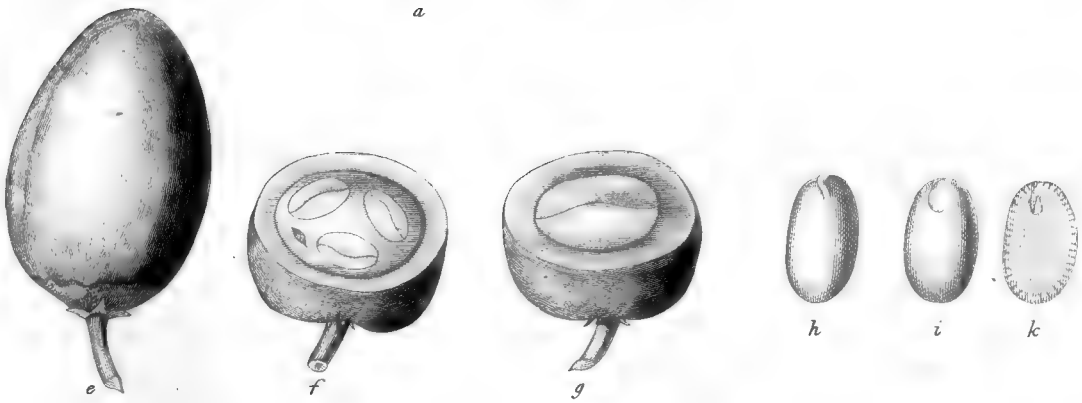

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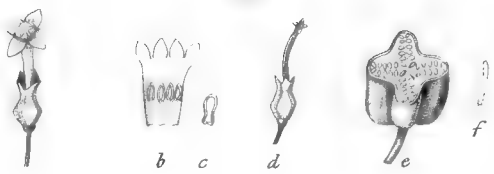


J. Curtis sculp.

VIII. *Description of the Cermatia longicornis and of three new Insects from Nepaul. By Major-General Thomas Hardwicke, F.R.S. and L.S. &c.*

Read January 21, 1823.

Order. CHILOPODA.

Fam. *CERMATIDÆ.*

Genus. CERMATIA Illiger.

Scutigera. *Lam., Latr.*—Scolopendræ pars *Linn., Fab.*

CERMATIA LONGICORNIS.

TAB. V. Fig. 1.

Scolopendra longicornis. *Fab. Ent. Syst.* ii. 390.

Scutigera longicornis. *Latr. Hist. Nat. des Crust. et Ins. vol.* vii. *p.* 89.

Scutigera lineata? *Latr. Dict. d'Hist. Nat. vol.* xxx. *p.* 446.

Body, when viewed beneath, having sixteen segments, which are united above by eight unequal scuta. *Antennæ* of a pale colour, as long as the body, finely setaceous with three principal joints, each of which is numerously articulated. *External maxillary feet* or mandibles strong, subulate, incurvate, four-jointed. *Maxillary palpus* four-jointed, hairy, or rather spinulose, longer than the mandibles. *Eyes* large, hemispherical. *Feet* very long, fifteen on each side, with the last pair twice as long as the others. The prin-

cipal articulations of the legs, viz. the two femoral joints and the tibiæ, are armed with stiff setæ. The *tibiæ* are flattened, angular, and of a pale colour, marked with transverse bands of a blueish-black. The *tarsi* are filiform, numerously articulated, and ending with a single subulate claw; and, with the exception of the hinder pair, which are transversely banded like the tibiæ, are of a pale-yellow colour.

The longest specimen hitherto examined was one inch and a quarter in length from the base of the antennæ to the tail. Antennæ one inch and a half; and posterior legs $2\frac{2}{10}$ inches.

This insect is found in damp houses under floor mats in all parts of Bengal, Bahar, and Orissa, but mostly during the rainy season, as Illiger has observed of his *C. lineata*. When living, the colours of the back and legs are bright, and varied between yellow, black, and brown; and although the above description by no means corresponds with the *Cermatia livida* described by Dr. Leach in the third volume of the *Zool. Miscellany*, it appears to answer to that of the *Scolopendra longicornis* of Fabricius.

Order. NEUROPTERA.

Fam. *PANORPIDÆ.*

Genus. PANORPA. Linn.

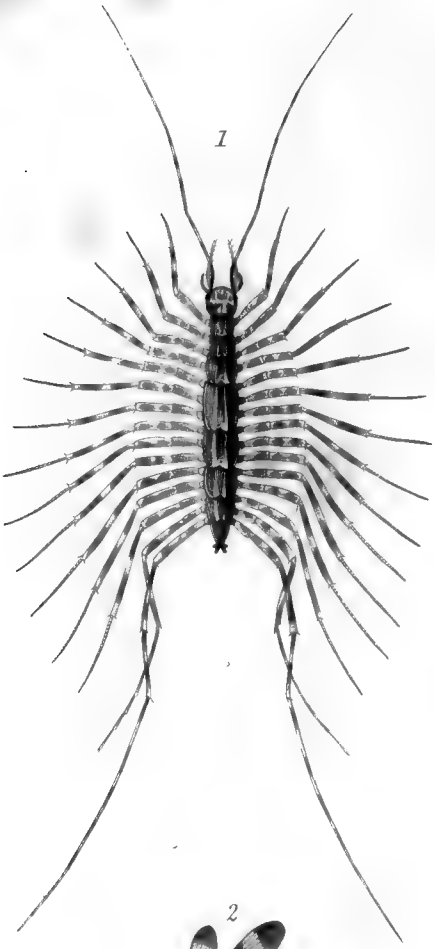
PANORPA FURCATA.

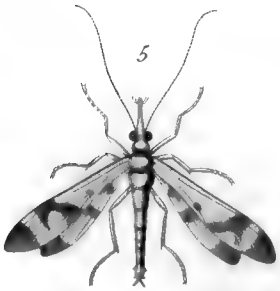
P. rufa, antennis nigris, alis hyalinis: superioribus puncto marginali fasciâ furcatâ apiceque nigris.

TAB. V. Fig. 2—6.

Head small, vertical. *Eyes* large, prominent. *Ocelli* three, behind the antennæ, nearly confluent. *Rostrum* as long as both head and thorax; subcylindrical, smooth. *Palpi* four, subequal, four-jointed. *Jaws* minute, subulate; the *apex* of the

Trans. Linn. Soc. Vol. XIV. Tab. V. p. 133.





J. Curtis sculp.

the *rostrum* ciliated. *Antennæ* filiform, as long as the body; articulations very numerous (about 52), placed between the eyes and approximating at the base. *Body* elongate, subcylindrical, slightly marginated, tapering: the dorsal margin of the third segment in the male, produced into an obtuse spur, equal to the breadth of the next segment; and the last segment being furnished laterally with two similar setæ. The *tail* of the male consists of three joints, the two first cylindrical and as long as the abdomen; each enlarged at its junction with the next; the third joint short, urn-shaped and forcipated; the *forceps* resembles the sting of the Scorpion. *Wings* long, ovate, subequal; broadest at the apex, a little longer than the body, hyaline; nerves brown, spotted at the base, double-barred at the apex. *Legs* long, the posterior pair longest, the shanks armed behind with two straight setæ. *Tarsi* five-jointed, the first as long as all the rest: all finely armed with setaceous hairs. *Claws* black, finely pectinated; the surface of all the legs, when viewed under a lens of strong power, appears to be finely annulated.

REFERENCES TO THE FIGURES IN TAB. V.

Fig. 1. *Cermatia longicornis.*
2. *Panorpa furcata*, Male.
3. ———— Head magnified.
4. ———— Chela magnified.
5. ———— Female.
6. ———— Apex of the abdomen magnified.

Order.

Order. HEMIPTERA.

Fam. *GERRIDÆ.*

Genus. GERRIS. Latr. *Cimex.* Linn.

GERRIS LATICAUDATA.

G. rufa, antennis tarsisque nigris, caudâ utrinque bidentatâ supra unguiculatâ infra penicillatâ.

TAB. VI. Fig. 1—4.

Antennæ filiform, four-jointed, the first elongate, all cylindrical, porrected, black; the last joint shortest and incurvate. *Head* shorter than the thorax; *eyes* prominent; *snout* inflected, short. *Thorax* roundish, convex, smooth; thicker and shorter than the abdomen. *Body* sublinear, of eight distinct rings and a dilated tail, pointed at the apex, and furnished on each side with a pencilled tuft and a hooked seta. *Wings* incumbent, cruciate, membranaceous, hyaline, subequal. *Legs*, the anterior pair simple, stronger than the rest, porrected; the *tarsi* two-jointed. The anterior thighs compressed, with the inferior margins densely hairy; the second pair twice as long as the first, and having their inferior margin ciliated; the third pair rather longer than the second, with the thighs cylindrical, armed, as in the Grasshopper tribe; the tarsi of the four posterior feet are apparently two-jointed, but so finely tapered as to require a strong lens to detect the articulation and the didactyle claws.

The prevailing colour of the insect is a light brown; the thighs of the first pair of legs longitudinally streaked with black; thorax and sides beneath whitish silvery down.

Length of the insect from the base of the snout to the end of the tail eleven lines.

Some

Some of these insects are found without wings, most likely in the larva state.

Order. DIPTERA.

Fam. *TABANIDÆ.*

Genus. PANGONIA. Latr.

PANGONIA LONGIROSTRIS.

P. villosa flava, thorace ferrugineo, abdomine nigro-brunneo: segmentorum marginibus flavis, alis immaculatis.

TAB. VI. Fig. 5. 6.

Rostrum about twelve times longer than the head. *Antennæ* approximated at the base, short, consisting of three pieces, the two lowest of which are very small, the upper one long, tapering to a point, and composed of eight small articulations. *Eyes* large, very prominent. *Head* and *thorax* very hairy both above and beneath, longer under the throat; of a bright yellow beneath, brownish above. *Wings* longer than the abdomen, hyaline; *costal nerves* brown. *Body* black; the margins of each segment shining, the sides hairy. *Halteres* short, having the shafts yellow and the knobs ovate, black.

Length of the insect from the base of the rostrum to the apex of the abdomen ten lines; and of the rostrum two inches and a half.

THOMAS HARDWICKE,
Major-General.

CALCUTTA,
January 6, 1822.

REFE-

REFERENCES TO THE FIGURES IN TAB. VI.

Fig. 1. *Gerris laticaudata.*
2. ——————— Nympha.
3. ——————— Head and antenna magnified.
4. ——————— Apex of abdomen magnified.
5. *Pangonia longirostris,* magnified.
6. ——————— Under view of the head magnified.

J. Curtis sculp.

IX. *The Natural History of Phasma cornutum, and the Description of a new Species of Ascalaphus. By the Rev. Lansdown Guilding, B.A. F.L.S. &c.*

Read March 18, 1823.

Ordo. ORTHOPTERA. *Oliv.* HEMIPTERA. *Linné.* ULONATA. *Fabr.*

PHASMADÆ.

PHASMA. *Lich., Fab.*

Spectrum. *Stoll., Lam.*

* Teretia, pedibus longissimis, tenuibus, compressis.

† Aptera, elytris alisque in utroque sexu nullis.

PHASMA CORNUTUM.

P. cinereo-rufescens, capite cornuto; pedibus inermibus, angulatis, subæqualibus.

MAS. Filiformis, pedibus fusco-fasciatis.

TAB. VII. Fig. 1.

Phasma filiforme. *Lich. in Act. Soc. Linn. tom.* vi. *p.* 9. *tab.* 1. *f.* 1. pessima.

Mantis filiformis. *Gmel. Syst. Nat. p.* 2048. *n.* 15? *Fab. Ent. Syst. tom.* ii. *p.* 12? *Mant. Ins.* i. *p.* 227. *n.* 1?

Phasma filiformis. *Fabr. Suppl. p.* 186?

Browne Hist. Jamaicæ, p. 433. *t.* 42. *f.* 5.

Hæc synonyma difficillima, quum nomen "filiforme" vix specificum, sed potius Phasmatum apterorum maribus subgenericum.

FŒMINA. Mare fere duplo major, fasciis femoralibus indistinctis.

P. cornutum. *Lich. in Act. Soc. Linn. tom.* vi. *p.* 10.
———————— *Stoll, Mant. t.* 13. *f.* 51.

DESCRIPTIO. *Corpus* elongatum, granulatum. *Oculi* parvi, prominuli. *Capitis* cornicula auriformia. *Oviductus* (TAB. VII. Fig. 3.) cymbiformis. *Pedes* æquales, femoribus ad basin dilatatis, articulo tarsorum longissimo triangulari.

Coloris varietates multæ: sed ♂ et ♀ sæpiùs cinereo-nigri.

Phasma cujus vita hic patet inter species confusas memorandum. Sexus copula vinctos iterum iterumque observavi, quamobrem nomen "filiforme" fœminæ maturæ nullo modo accommodatum omnino neglexi.

Habitat frequentissime in Americæ mediæ insularumque oppositarum dumetis, ubi ramulos emortuos æmulatur, hostesque sic decipit. Noctu folia avidè consumit. Ambulat motu omnino vacillanti: dum quiescit pedes anticos capiti applicat, antennasque teneras defendit. Vitæ tenax. Succi virides vel pallidi.

Tempus: occurrit imago per totum annum. Nuptias instituunt mensibus Maio, Junio. *Ova* numero 22 ponit fœmina men. Sep.—Nov. *Quies* ovi 79—100 dierum. *Larva* junior excluditur ovo mensibus Martio—Augusto.

Larva nuper ab ovo exclusa (TAB. VII. Fig. 10.) pallida pedibus fasciatis; exuviis primis demissis celerrime crescit, dum cornua apparent, corpusque rubescit. Si pedem vi amittat, mox exuviis iterum exutis renascitur, sed minor.

Pupa vix ab imagine discrepat.

Ovum

Ovum (Tab. VII. Fig. 5—7) solidum, carneo-rufescenti nebulosum punctis excavatis sparsis, maculâ laterali cateniformi medio brunneâ: operculo (fig. 8. 9.) favoso, flavescenti.

Phasmatis nostri ova diu in oviductu sustentantur dum durescant. Etsi mantis ova caute ponuntur, hæc sine ullo consilio rejiciuntur.

Long. corp. antennis exclusis.

Maris. 3 un. 9 lin.

Fœminæ. 7 un. 4 lin.

Ordo. NEUROPTERA. *Linn.*

Fam. *MYRMELIONIDÆ.*

ASCALAPHUS. *Fabr., Oliv., Lam., Latr.*

Myrmeleon. *Linn.*
Libelloides. *Schæffer.*

Character Genericus.

Caput magnum.

Oculi maximi, prominentes, e duobus segmentis inæqualibus conformati.

Stemmata nulla.

Antennæ inter oculos insertæ, longissimæ, clavato-capitatæ, capitulo mox obtrigono compresso, mox abrupte terminato mox oblongo rotundato.

Palpi breves, filiformes; labiales paulo longiores.

Corpus hirtum.

Thorax ovatus.

Abdomen sublineare, thorace longius.

Alæ subæquales, deflexæ, abdomine longiores.

Pedes hirsuti, breves.

Tarsi 5-articulati.

Novæ speciei descriptione subjunctâ, characterem genericum quem in *Miscell. Zoolog.* tradidit sagax ille naturæ interpres Dom. W. E. Leach, corrigere tentavi; sic operam minime perditurus si vel unicum insectum detexero antea ignotum.

ASCALAPHUS MACLEAYANUS.

(TAB. VII. Fig. 11.)

A. alis vitreo-iridescentibus, immaculatis: oculis thoraceque cupreo-nigris: dorso maculato: ventre cinereo.

DESCRIPTIO. *Os pedes*que rufescentes; *antennæ* nigricantes; *capitulo* subtus pallido. *Pterigostia* nigra. *Stigmata* atra. *Dorsum* ferrugineo-rufescens, maculis brunneis ornatum.

Varietas β. (an sexus alter?) maculâ subtus alarum posticarum stigma nigrescente.

Ova oblonga, cinerascentia, gregatim posita.

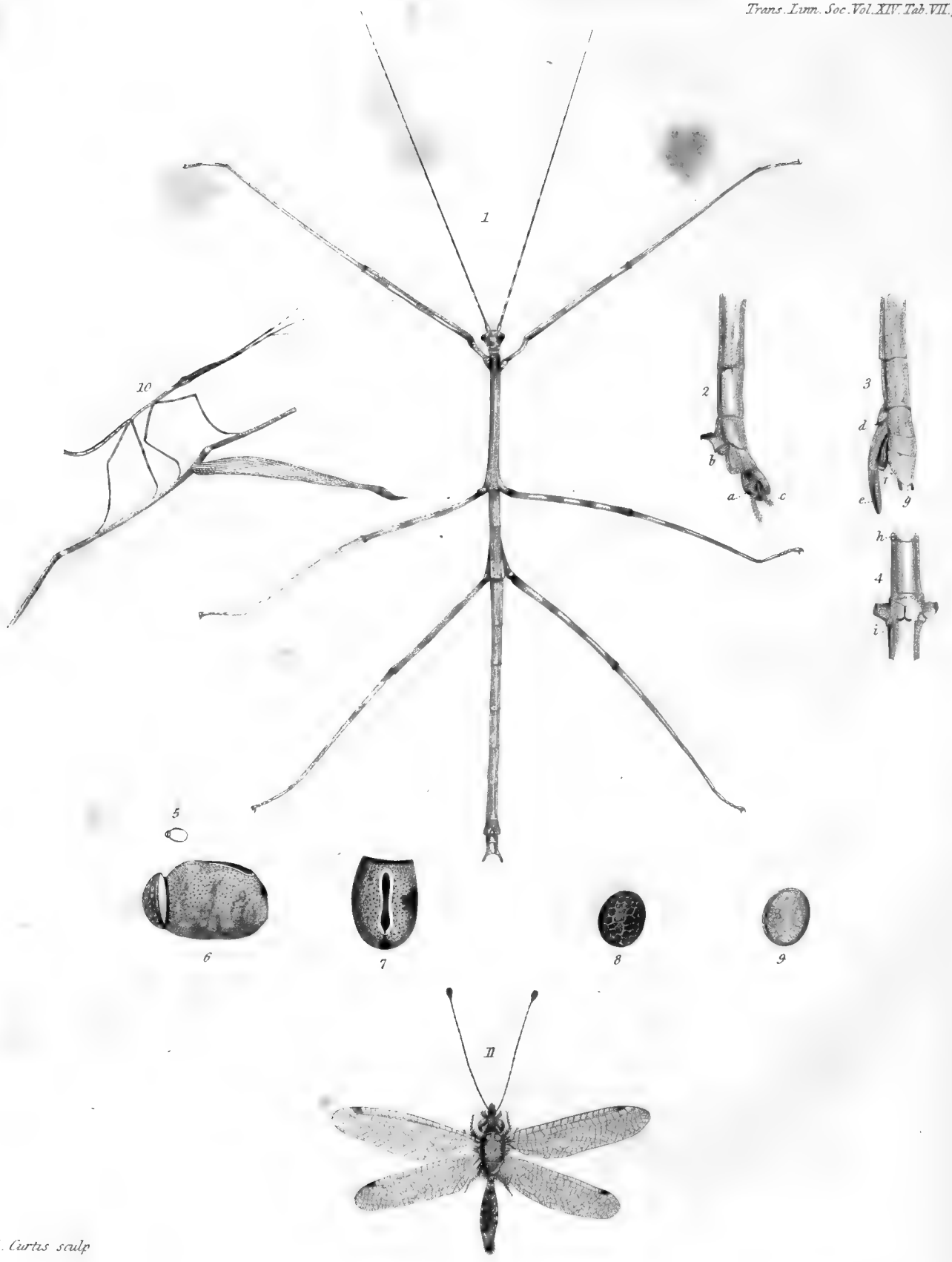
*Larva Pupa*que latent.

Habitat solitarius, volatu diurno satis frequens in dumetis S^{ti} Vincentii; ramulis emortuis sæpe quiescit, hostesque colore fugit.

Tempus. Mensibus Maio, Jan., Feb., occurrit.

Viro amicissimo, insectorum musæi longe lateque celebris digno possessori, Domino Alexandro MacLeay, S.R. et S.L. Soc., hæc species inedita dicatur.

EXPLI-



J. Curtis sculp

EXPLICATIO TABULÆ VII.

Phasma cornutum.

Fig. 1. Mas adultus.

2. Instrumenta generationis maris aucta. *a*. Penis rigidus, recurvus. *b*. Testes. *c*. Hamuli ad arctiorem copulam.

3. Instrumenta partûs fœminæ, mag. nat. Littera *d*. Vagina. *e*. Oviductus cymbiformis. *f*. Ovum corniculis lateralibus fultum. *g*. Anus.

4. Pars ventris. *h*. Spiraculum laterale. *i*. Spiraculum ventrale maximum.

5. Ovum magnitudine naturali.

6. 7. } Ova aucta.

8. 9. } Opercula aucta utrinque visa.

10. Larva nuper ab ovo exclusa quiescens, pedibus extensis.

Ascalaphus Macleayanus.

Fig. 11. Fœmina gravida, mag. nat.

X. *On the Generic and Specific Characters of the Chrysanthemum Indicum of Linnæus, and of the Plants called Chinese Chrysanthemums. By Joseph Sabine, Esq. F.R.S. F.L.S. &c.*

Read March 18, 1823.

In a former communication* to the Linnean Society, I endeavoured to establish the correctness of my opinion, that the plants now cultivated in our gardens under the name of Chinese Chrysanthemums, had been improperly referred to the *Chrysanthemum Indicum* of Linnæus. Since the paper alluded to was written, I have had opportunities of examining and comparing living specimens of what I consider the real *Chrysanthemum Indicum* with those of the Chinese Chrysanthemum; which latter I now design to characterize as a distinct species under the name of *Chrysanthemum Sinense*.

Among several varieties of the Chinese Chrysanthemums recently imported by the Horticultural Society, are some in which the ligulate florets are only radial, or in the circumference, the disc being occupied with tubular florets; these are consequently in a state more nearly resembling (if not entirely assimilating with) the natural type than any of the varieties in which the ligulate florets extend over the whole or nearly the whole surface of the disc, and which are considered as double flowers, those varieties previously known being all more or less of this latter description. On examination of the flowers of the new varieties above alluded

* Observations on the *Chrysanthemum Indicum* of Linnæus, vol. xiii. p. 561.

to,

to, which by the gardeners are called semi-double, from their having, as is supposed, more radial florets than are strictly natural, I observed that the receptacles, as far as they were covered with the tubular florets, were destitute of paleæ, and that a few of the chaffy processes only were observable in the circumference of the flowers where the ligulate florets were placed. In the plants with double flowers, where the ligulate florets extend over the whole disc, paleæ were uniformly observable in greater or less quantity; but whenever any of the flowers of the latter plants from particular causes had lost the full double appearance and showed a portion of the disc covered with tubular florets, in those cases paleæ ceased to be formed on that portion of the disc covered with the tubular florets. I therefore conclude, that the production of the paleæ on the disc, when the tubular are changed into ligulate florets, is the consequence of the luxuriance of the flowers; the rudiments of the paleæ which exist on the disc in the flower in its natural state are elongated into chaffy processes, by the same operating cause which converts the tubular into ligulate florets.

As the existence of paleæ on the receptacle of the flower was the only ground on which the Chinese Chrysanthemums had been referred to the genus *Anthemis*, I presume that the facts above stated will be considered as conclusive against such reference, and that consequently the original application by the English botanists of the Chinese Chrysanthemum to the genus *Chrysanthemum* is correct.

Soon after I had examined the semi-double or single flowers of the Chinese Chrysanthemums, a plant which had been imported by Mr. Samuel Brookes, of Ball's Pond, from China, and which he had presented to the Horticultural Society, came into blossom in the Society's garden. On this plant it was with the greatest satisfaction I observed the flower conforming exactly with

with the characters given by Linnæus to his *Chrysanthemum Indicum*, and agreeing not only with the descriptions of the authors he had referred to, but with the specimens of the different Herbaria in which the plant referred to by Linnæus as his *C. Indicum* was to be formed. The whole appearance of it is so decidedly different from that of any of the Chinese Chrysanthemums, that even before it blossomed, doubts of their specific identity might have been entertained, without much examination; but the blossoms are so different, that in its flowering state, they could not possibly be taken for the same.

The following characters and descriptions with reference to the different works in which the two species are treated of, is the result of the comparison instituted.

CHRYSANTHEMUM INDICUM.

C. foliis flaccidis petiolatis pinnatifidis crebrè dentatis; supremis integerrimis, radio calyce paulo longiore, caule fruticoso.

Matricaria Japonica flore minore, &c. *Breyn. Prod.* ii. *p.* 66.

Tsjetti-pu. *Rheede Hort. Mal. vol.* x. *p.* 87. *tab.* 44.

Matricaria Madraspatana, &c. *Mus. Pet. p.* 76. *no.* 786.

Chrysanthemum Madraspatanum, &c. *Pluk. Alm. p.* 101. *tab.* 160. *fig.* 6.

Matricaria Sinensis, minore flore, &c. *Pluk. Amalth. p.* 142. *tab.* 430. *fig.* 3.

Matricaria Indica, &c. *Moris. Hist. vol.* iii. *p.* 33.

Matricaria Sinensis, &c. *Vaillant Act.* 1720. *p.* 285.

Matricaria Zeylanica hortensis, &c. *Raii Supp. p.* 224.

Matricaria flore pleno magno. *Herm. Mus. Zeylan. p.* 33. *Burm. Thes. Zeylan. p.* 153.

Matricaria Zeylanica hortensis, &c. *Linn. Flor. Zeylan. p.* 198. *no.* 421.

Matricaria Sinensis. *Rumph. Amboin. vol.* v. *p.* 259. *tab.* 91. *fig.* 1.

Chrysan-

Chrysanthemum Indicum. *Linn. Sp. Pl. vol.* ii. *p.* 889.—*ed.* 2. *vol.* ii. *p.* 1253. *Persoon Syn. vol.* ii. *p.* 461. *Willd. Sp. Pl. vol.* iii. *p.* 2147. *Sabine in Trans. Hortic. Soc. vol.* iv. *p.* 326. cum figuris.

Habitat in Chinâ.

The plant is upright, of more humble stature than the Chinese Chrysanthemums, with slender and generally more numerous branches, the whole foliage being of a pale green. The leaves are small, of thin and soft texture, with very frequent and acute denticulations; the uppermost leaves quite entire. In the flowers the ray is very little longer than the calyx, and the colours of the ligulate florets in variation change but little from yellow, which appears to be their natural colour.

Chrysanthemum Sinense.

C. foliis coriaceis petiolatis sinuato-pinnatifidis dentatis glaucescentibus, radio longissimo, caule fruticoso.

Matricaria Japonica maxima, &c. *Breyn. Prod.* ii. *p.* 66.

Matricaria Japonica maxima flore roseo, &c. *Pluk. Alm. p.* 243.

Matricaria Japonica maxima flore multiplici flavescente, Shamouty Malabarorum. *Pluk. Amalth. p.* 142?

Matricaria, &c. *Kæmpfer Amœn. Exot. pp.* 875—877.

Chrysanthemum Indicum. *Thunb. Flora Jap. p.* 320.

Anthemis grandiflora. *Ramat. Journ. d'Hist. Nat. vol.* ii. *p.* 233.

Chrysanthemum Indicum. *Loureiro Flora Cochinchin. p.* 499. —*edit.* 2. *à Willd. vol.* ii. *p.* 610. *Bot. Mag.* 327.—2042.

Anthemis Artemisiæfolia. *Willd. Nov. Act. Soc. Nat. Scient. Berol. vol.* iii. *p.* 431.—*Sp. Pl. vol.* iii. *p.* 2184.—*Enum. vol.* ii. *p.* 911.

Anthemis stipulacea. *Mœnch. Supp. ad Meth. Plant. p.* 258.

Chrysanthemum Indicum purpureum. *Pers. Syn. vol.* ii. *p.* 461.

Chrysanthemum Indicum. *Hortus Kew. edit. 2. vol.* v. *p.* 95. *Botanical Register*, 4.—455.—616.

Chinese Chrysanthemum. *Sabine in Trans. Hortic. Soc. vol.* iv. *p.* 326.—*vol.* v. *p.* 149.—*in Trans. Linn. Soc. vol.* xiii. *p.* 561.

Habitat incultum in Japonia (*Kæmpfer*, *Loureiro*); cultum (multis varietatibus) in hortis Sinarum atque Japoniæ.

The branches are usually few, robust, and grow somewhat diffusely; the foliage is dark. The leaves are large, firm, and rather obtusely toothed, with distant denticulations, the uppermost leaves toothed like the rest. The ray of the flowers is equal to or larger than the diameter of the disc, and is subject to vary with the greatest diversity of colours.

The varieties of the *Chrysanthemum Sinense* are most numerous in the gardens of the Chinese, and cultivated with the greatest art and attention. They have lately become objects of much attraction to the British gardener. The first of these was introduced from France in 1790, having been brought from China to Marseilles in 1789. Between 1798 and 1808, eight new varieties had been imported from China, one by Mr. Evans of Stepney, the other seven by Sir Abraham Hume. To these nine Chinese varieties, a tenth raised in England was added. These remained without further accession till 1816: between that year and the present the number has been increased by the addition of seventeen new ones, one introduced by Mr. Palmer of Bromley, two by Mr. Brookes of Ball's Pond, and twelve by the Horticultural Society; of the remaining two, the origin of one cannot be traced, and the other was produced in England from one of the older varieties.

I am aware that an objection may be urged to the specific name I have applied to these plants, on the ground of their being natives of Japan, and only known in China in the gardens. But

But in reply to it, I should observe, that they were originally obtained from China, and we know it is in that country that they have been brought to their present state of beauty and perfection: that for these reasons they are now known all over Europe as the *Chinese Chrysanthemums;* and that, as they have hitherto been confounded with the *C. Indicum,* it is very desirable they should be distinguished by an appellation well opposed to that of the other species.

XI. *Descriptions of Seven new British Land and Fresh-water Shells, with Observations upon many other Species, including a List of such as have been found in the County of Suffolk. By the Rev. Revett Sheppard, F.L.S.*

Read March 4, 1823.

In the Descriptive Catalogue of British *Testacea*, published by Dr. Maton and Mr. Rackett, in the eighth volume of the *Linnean Transactions*, the *habitats* of the Land and Fresh-water Shells having for the most part been confined to the midland and western counties, I have been induced to lay before the Society a description of seven new species, and a list, with copious observations, of the Land and Fresh-water Shells hitherto discovered in the county of Suffolk, and occasional notices of places in which they have been found in Essex*; by which it will be seen, that the eastern parts also of this island are equally fertile in those elegant and interesting productions of Nature. The utility of such an undertaking seems to be generally allowed; and should this humble attempt meet with approbation from the lovers of conchology, I shall be amply gratified.

Although I have followed Linnæus's arrangement in preference to any other, from the opinion that the Land and Fresh-water Shells are all reducible to his genera; I must nevertheless, in justice to M. Draparnaud, remark, that I esteem his work to be a most admirable one; and that his genera (at least those adopted by him), considering them as subdivisions of the Linnæan genera, are, with few exceptions, *secundum naturam*.

* My knowledge of Essex is confined to the hundred of Tendring, a peninsula formed by the German Ocean and the rivers Stour and Colne.

ARRANGE-

ARRANGEMENT OF THE SUFFOLK LAND AND FRESH-WATER SHELLS.

TELLINA	1. cornea	CYCLAS of *Draparnaud* and *Lamarck.*
	2. stagnicola	
	**	
	3. amnica	
	4. Henslowana	
MYTILUS	5. cygneus	ANODONTA, *Drap.* and *Lamarck.*
	6. anatinus	
	7. Macula	
BULLA	8. fontinalis	PHYSA, *Draparn.* and *Lamarck.*
	9. hypnorum	
BUCCINUM	10. terrestre	BULIMUS, *Drap.* ACHATINA, *Lam.*
TURBO	11. viviparus	PALUDINA, *Lam.*
	12. achatinus	CYCLOSTOMA, *Dr.*
	13. tentaculatus	
	14. elegans	CYCLOSTOMA, *Dr.* and *Lamarck.*
	15. fontinalis	
	16. Leachii	
	**	
	17. laminatus	CLAUSILIA, *Drap.* and *Lamarck.*
	18. nigricans	
	***	
	19. Carychium	AURICULA, *Drap.* and *Lamarck.*
	****	
	20. tridens	PUPA, *Lamarck.*
	*****	
	21. perversus	PUPA, *Draparnaud* and *Lamarck.*
	22. muscorum	
	23. marginatus	
	24. Offtonensis	
	25. sexdentatus	
	******	
	26. nautileus	PLANORBIS, *Dra.* and *Lamarck.*
	*******	
	27. cristatus	VALVATA, *Drap.* and *Lamarck.*

HELIX	28. planorbis	PLANORBIS, *Drap.* and *Lamarck.*
	29. planata	
	30. complanata	
	31. vortex	
	32. cornea	
	33. spirorbis	
	34. contorta	
	35. Draparnaudi	
	36. alba	
	37. fontana	
	**	
	38. Somershamiensis	HELIX, *Draparn.*
	39. lapicida	CAROCOLLA, *Lam.*
	40. paludosa	HELIX, *Draparn.* and *Lamarck.*
	41. ericetorum	
	42. virgata	
	43. caperata	
	44. rufescens	
	45. Cantiana	
	46. nitens	
	47. nitidula	
	48. hispida	
	49. radiata	
	50. Kirbii	
	51. trochiformis	
	52 crystallina	
	53. spinulosa	
	54. arbustorum	
	55. nemoralis	
	56. hortensis	
	57. aspersa	
	***	
	58. Lackhamensis	BULIMUS, *Drap.* and *Lamarck.*
	59. obscura	
	60. lubrica	
	****	
	61. putris	SUCCINEA, *Drap.* and *Lamarck.*
	*****	
	62. stagnalis	LIMNEUS, *Drap.* LYMNÆA, *Lam.*
	63. palustris	
	64. fossaria	
	65. limosa	
	66. auricularia	
	67. lutea	
	******	
	68. pellucida	VITRINA, *Drapar.* and *Lamarck.*
NERITA	69. fluviatilis	NERITA, *Draparn.* NERITINA, *Lam.*
PATELLA	70. oblonga	ANCYLUS, *Drap.* and *Lamarck.*

2. TELLINA STAGNICOLA.

T. testa rhombea glabra, umbone exserto.

Cyclas calyculata, *var.* 2. *Lamarck*, *Anim. sans vert.* v. 559.

Habitat in stagnis.

Testa 4½ lin. longa, 5½ lin. lata, glabra, tenuis, pellucida, cornei coloris, epidermide nulla. Valvulæ versus marginem complanatæ.

This I have always considered to be a distinct species, and have described it under the name by which I was favoured with a specimen by Dr. Leach.

It may easily be distinguished from the *T. lacustris* of the *Linnean Transactions* and the *Cyclas calyculata* of Draparnaud, by the remarkable projection of its *umbones*, which appear like young shells glued upon those parts.

In abundance in a small pond at Offton, on Mrs. Leake's farm, on the right-hand side of the path leading to Somersham by the fields.

In ponds at Wrabness in the county of Essex it is very common. The gravel-pit pond on the glebe there produces a variety in which the *umbones* touch each other. It is remarkable that the young only of this species are to be found in the spring; the adults not emerging from their muddy retreats till the summer, when they rise near the surface, and adhere to plants in great quantities.

Cases formed of these shells by the *Caddis-worms* are very beautiful, resembling bunches of grapes.

4. TELLINA HENSLOWANA.

T. testa oblique subovata transversim vix sulcata, projecturâ a basi umbonis adornata.

Habitat in rivis.

Testa

Testa 2 lin. longa, 2½ lin. lata, cornei coloris, glabra, striata, vix sulcata, anteriùs planiuscula.

I first received this species from Dr. Leach, and a very distinct one it is. It belongs to the same group as *T. amnica*, having the hinge on one side; it is smaller than that species, but more tumid in proportion; and its decisive characteristic arises from a curious eave-like projection at the bases of the *umbones*.

Sparingly in the stream at Holbrook with *T. amnica*. They both seem to prefer a gravelly or sandy bottom.

Dr. Leach named this shell after his friend Professor Henslow, who, I believe, was its first discoverer.

6. Mytilus anatinus. *Trans. Linn. Soc. vol.* viii. *p.* 110.

This species, in some situations, has its *umbones* decorticated; in others the epidermis is entire. This difference cannot be assignable to the roughness or smoothness of the component parts of the soil in which they are imbedded; because, in rivers with a gravelly bottom, I have found them with the epidermis entire; in ponds, whose bottoms consisted of a soft mud, with the umbones decorticated.

Common in most rivers, and in many ponds. Those found in Mr. Kirby's pond at Barham, in the river at that place, and in Campsey Mere, vary from each other.

7. Mytilus Macula. *Trans. Linn. Soc. vol.* xiii. *p.* 86.

Ponds in my brother's garden at Campsey Ash.

Described as distinct from *M. anatinus* in a paper which the Society did me the honour to publish in their Transactions; and I am confirmed in that opinion, from the *anterior area* in both adults and young being sloped upwards; which is the case in the young only of *M. anatinus*.

12. Turbo

12. Turbo achatinus.

Cyclostoma achatinum. *Draparn.*

In great abundance, in the year 1820, on the beach at Felixstow, within the bay of Harwich, near to Languard-Fort, whither they must have been brought from some fresh-water stream; but I have never detected it in a recent state.

It is very distinct from *T. viviparus*; is the *Cyclostoma achatinum* of Draparnaud; and is unnoticed by Linnæus.

Is this the *Helix compactilis* of Dr. Pulteney? If it be, the *habitat* given by the Doctor is an erroneous one; for he says it is found in woods.

13. Turbo tentaculatus.

Helix tentaculata. *Trans. Linn. Soc. vol.* viii. *p.* 220.

Common in most rivers and streams. I have a specimen taken by my valuable friend Mr. Kirby out of a small stream near Lyndhurst in the New Forest, in which the lowest volution but one is slightly decussated, the horizontal striæ being the deepest.

The form of the mouths of this shell and *Turbo viviparus* warrants the withdrawing them from the genus *Helix*, and placing them with *Turbo elegans*. They, with some others, form an excellent subdivision of the Linnæan genus *Turbo;* and Draparnaud includes them in his genus *Cyclostoma*.

16. Turbo Leachii.

T. testa imperforata subovata, anfractibus 5 rotundatis oblique decurrentibus, sutura conspicua, apertura suborbiculari, operculo membranaceo.

Habitat in rivis.

Testa 3 lin. longa, $1\frac{3}{4}$ lin. lata, cornea, diaphana, glabra. Anfractus 5, teretes. Spira elongata. Apex acutus.

A di-

A distinct species, sent to me by Dr. Leach under the specific name of *ventricosa*. As, however, I have a curious shell very nearly allied to the *Clausilia ventricosa* of Draparnaud, and which may possibly be a variety of that species, (in which case it must be called *Turbo ventricosus*,) I have honoured this shell with the name of that distinguished naturalist Dr. Leach, to whose friendship I am indebted for the possession of many curious species and much valuable information.

Found sparingly in Campsey Mere, and Holbrook stream and mill-pond.

This species bears a great resemblance to the young of *Helix fossaria;* and being an operculated shell, it has probably been confounded with the young of *T. tentaculatus*.

17. Turbo laminatus. *Trans. Linn. Soc. vol.* viii. *p.* 179.

In moss upon the trunks of trees, and under the bark of, and upon, dead branches which have lain long upon the ground.

In Middlewood Offton; and in Great Blakenham and Friston woods.

I have a variety from Friston wood, in which the seven lower volutions are slightly decussated. It is the *Clausilia bidens* of Draparnaud.

18. Turbo nigricans. *Trans. Linn. Soc. vol.* viii. *p.* 180.

Common in the same situations as the preceding.

I have taken a curious variety in Friston wood much shorter and larger in girth than they usually are. Sometimes found with the *striæ* nearly obliterated.

The curious shell mentioned under the article *T. Leachii*, if not a variety of the *Clausilia ventricosa* of Draparnaud, must be assigned to this species. It was found under the bark of a tree on Harper's cliffs, in the parish of Levington; is a fusiform shell,

having three of the middle volutions vastly more prominent than the rest, and widely separated from each other.

20. TURBO TRIDENS. *Trans. Linn. Soc. vol.* viii. *p.* 181.

This rare and interesting species had hitherto been confined to a single *habitat*, viz. Amersham wood in Buckinghamshire; a specimen procured from which place I owe to the kind attention of my learned and worthy friend Dr. Goodall, Provost of Eton; but on the last day of May 1821, myself and son went on a conchological expedition to Friston wood, and in a space not exceeding fifteen feet square (where we were employed on our knees nearly two hours), under moss kept moist and shaded by a luxuriant growth of *Dog's Mercury* and thick underwood, we were fortunate enough to find twenty-four specimens. One of them had only two teeth, that on the lip being wanting, it probably being the last tooth formed. Young shells have the aperture narrow, acuminated, and without teeth; but there is a fold upon the *columella*. I have since procured thirty-eight specimens from the same spot.

It forms a subdivision of the genus *Turbo*, agreeing neither with the *Clausilia* nor *Pupa* of Draparnaud. It is scarcely necessary to add, that the *Pupa tridens* of that author is a very different shell.

As Dr. Pulteney says that *T. tridens* is *white*, and found on *water-plants*, I conclude his specimens to have been bleached, and conveyed from their natural situation by the waters of a flood.

23. TURBO MARGINATUS.

Pupa marginata, *Draparn.*

This species is dark-brown and sub-opake; the margin of the aperture is slightly reflexed and very narrow; and the tooth is short, perpendicular, and placed below it; whereas in *Turbo muscorum*

muscorum the margin is broad and reflexed, and the tooth is long, obliquely directed from right to left, and is on a level with it.

These shells are also found in very different situations; *T. muscorum* inhabits moss upon the bark of trees in shady and moist places; *T. marginatus*, on the contrary, is only found in dry pastures and the most open places. The young much resemble *Trochi*.

Not uncommon under stones and sticks in Little Blakenham: and within the bounds of Ipswich, not far from the *Red-House*, as you go towards Westerfield by the fields. Specimens found in the above situations never exceeded $1\frac{1}{4}$ lin. in length, and had 6 volutions, answering exactly to the *Pupa marginata* of Draparnaud.

I have since found the same species at Shotley, at the roots of grass on the marsh within the Sea Wall; and in profusion in Essex, near Wrabness point, on the upper part of the marsh; a situation which at high spring-tides is covered with water. These latter shells were $1\frac{3}{4}$ lin. in length, and had 7 volutions. Some of them were without the white band or hood above the margin, which is probably attained by age; and one specimen had the aperture rather sloped towards the base, and the *umbilical cleft* of course oblique; such a variety answers well to the *Pupa umbilicata* of Draparnaud, which is probably, therefore, only a variety of *T. marginatus*.

The same species has been found on the summit of Harwich cliff.

24. Turbo Offtonensis.

T. testa fusca striata subpellucida, anfractibus septem secundis sensim minoribus, aperturâ rotundatâ edentulâ nec marginatâ.

Habitat super gramina et arbusta in sylvis, super truncos arborum, atque inter folia putrescentia.

Testa plusquam $1\frac{1}{4}$ lin. Angustior quam *T. muscorum* et *T. marginatus*,

ginatus, et spiris sensim minoribus. Apertura edentula, margine nec reflexo, nec diverso colore.

In young shells the whorls do not decrease gradually, the two first being much smaller in proportion to the rest.

Found abundantly in the summer season by brushing long grass and bushes in Middlewood Offton; and in a grove at Somersham, on the left side of the road leading from that place to Flowton. Amongst dead leaves at the roots of grass in Friston wood.

In Essex it is taken upon trees on Wrabness cliff, at Ramsey decoy, and in Stourwood.

It is not a little singular that the Essex specimens should be uniformly darker than those found in Suffolk. The *Pupa edentula* of Draparnaud has only five volutions, and possibly may be the young of this species.

25. TURBO SEXDENTATUS. *Trans. Linn. Soc. vol.* viii. *p.* 183.

Under stones and pieces of wood at Levington, Spexhall and Offton, but by no means common.

In Essex, at the roots of grass by the River Stour; at Wrabness near Bradfield-bay; and in the open part of the Glebe grove, whence a specimen was procured with a dark band following the order of the volutions.

The *habitat* of this species, as given by Montagu, is clearly a wrong one, and must mislead those who search for it. He probably found it creeping up the *Iris pseudacorus*, in consequence of its having been conveyed to such a situation by the waters of a flood.

26. TURBO NAUTILEUS. *Trans. Linn. Soc. vol.* viii. *p.* 169.

In both the Glebe ponds near the Parsonage at Spexhall; in the pond at Offton, where *Tellina stagnicola* is found; and in a pond in Dynes's meadow, near Nettlestead Church.

In

In Essex it is in great abundance in a pond on the right-hand side of Mrs. Gox's Lane, Wrabness.

Those found at Spexhall are minute, greenish, and have long reflexed spines; in other situations where I have found them, they have been considerably larger, reddish, with much shorter spines.

This species varies in size and colour, and in being with or without *annuli* and *spines;* in consequence whereof M. Draparnaud has made two species, viz. *Planorbis cristatus* and *Planorbis imbricatus*, but without sufficient reason.

28. Helix planorbis. *Trans. Linn. Soc. vol.* viii. *p.* 188.

River Gipping and adjoining ditches.

From Ramsey stream in Essex I have a curious deformed variety, in which the volutions are nearly disjoined, or pulled out *si ita dicam.*

30. Helix complanata. *Linn. Syst. Nat. ed.* xii. *vol.* ii. *p.* 1242.

River Blythe, near Halesworth; Baylham pond; ditches by the River Ore at Blaxhall; Holbrook stream and mill-pond; and ditches near the River Stour at Higham.

That this is the true *Helix complanata* of Linnæus, some learned conchological friends coincide with me in opinion. Notwithstanding, however, that its appearance is so much in favour of its being a distinct species, it may after all be the young of *H. planata.* It is certainly found in the places where that shell occurs; and although its under superficies be flat, yet by age the under-side of the lowest volution may become tumid, which would throw the *carina* into the middle of the whorl, and cause it at once to become a very *Helix planata.* This is however merely conjecture, but such as may hereafter be verified:

verified: and it must be allowed that greater changes than this do actually take place betwixt the young and old of many of our land and fresh-water shells.

33. HELIX SPIRORBIS. *Trans. Linn. Soc. vol.* viii. *p.* 191.

In the stream and ditches at Brantham, by the road between Ipswich and Manningtree.

In abundance in the Glebe ponds at Wrabness, Essex.

A variety sometimes occurs in which the volutions appear as if pressed out from the base towards the vortex; and being almost disjoined, cause the shell to resemble a little basket. In another variety, and I have found a similar one of *Helix vortex*, the mouth is enlarged and turned over the preceding volution, which gives the idea of a serpent coiled up.

This is the shell first distinguished as *H. spirorbis* by Montagu; yet it does not answer to the terms *albida* and *pellucida*, which Linnæus uses in his description; for it certainly has no pretension to be called *whitish;* nor is it so transparent as *Helix vortex*, to which Linnæus applies the term *subpellucida*. Neither will it at all agree with Draparnaud's figure and description of *Planorbis spirorbis*, which is both *albida* and *pellucida*; for, as he describes his shell *supra plana*, *carina media*, *anfractu ultimo majore*, of course *that* cannot be the species intended by Linnæus.

35. HELIX DRAPARNAUDI.

H. testa supra subconcava subtus concava subcarinata, anfractibus quatuor transversim striatis: ultimo majore.

Habitat in aquis dulcibus.

Testa diametro 3 lin. supra grisea, subtus albida, nitescens; anfractibus quatuor, ultimo, in medio juxta aperturam, subcarinato. Apertura dilatata.

This

This shell, of which I have taken two specimens in Holbrook mill-pond, is of nearly the same shape with *H. alba*, yet cannot be mistaken for it. It agrees also in many respects with *Planorbis spirorbis* of Draparnaud, which is a different species from the *H. spirorbis* of *Syst. Nat.* as I have remarked in its place, but being striated in the transverse direction, a circumstance unnoticed by him, and which he could not have overlooked, it must be considered as new; and I have accordingly honoured it with the name of that sagacious conchologist.

37. Helix fontana. *Trans. Linn. Soc. vol.* viii. *p.* 193.

Pond in the Round Meadow, on the estate of John Sheppard, Esq. of Campsey Ash; and in Baylham pond.

In Ramsey decoy-pond, Essex.

The identity of this species with *Nautilus lacustris* is I know looked upon as certain by some conchologists: I can only say, that I have taken some thousands of them without their assuming in a single instance the form of that shell.

38. Helix Somershamiensis.

H. testa grisea umbilicata, anfractibus 2 vix 3 reticulatis.
Habitat in sylvis, rarissima.

Equal in magnitude to a middle-sized *H. alba*, which it resembles in shape; is of a greyish colour, and curiously reticulated, particularly above.

The only two specimens I have met with were adhering to the under-side of a small decayed branch of oak, in a grove on the left-hand side of the road leading from Somersham to Flowton.

It is perfectly distinct from any species hitherto described; and, from its similarity in shape to *Helix alba*, has been placed

as

as a connecting link at the head of the next subdivision; yet possibly may, though a land shell, belong to the same: but I can give no further description, my specimens having been lent some years since to a gentleman, from whom I have not yet received them.

41. HELIX ERICETORUM. *Trans. Linn. Soc. vol.* viii. *p.* 194.

By the side of a pond in one of the Glebe fields of Offton; and on Felixstow Common, between the cliffs and Ferry-house in great abundance.

This species is found as well without as with bands; and I have observed that in fruitful situations it is oftener without bands than it is in the more sterile. I have two specimens from Winthorpe in Nottinghamshire, one with bands, the other without; in both the upper superficies is flat, and the lower remarkably tumid, sloping from the circumference to the *umbilicus*.

46. HELIX NITENS. *Trans. Linn. Soc. vol.* viii. *p.* 198.

Common in woods and shady places under moss, stones, and pieces of wood. Very fine specimens are to be obtained in Friston wood.

The inhabitant is black, and has a very fetid smell, much resembling that of the urine voided by the common snake *se defendendo*, and by which one may frequently be guided to the spot where it is. In some instances this odour is not observable till the shell has been immersed in boiling water.

47. HELIX NITIDULA. *Draparnaud.*

In Middlewood Offton.

In Essex I have taken it in the plantation at the end of my lawn; at Wrabness and Ramsey decoys; in the parish of Beaumont; and in the great wood at Thorington.

An

An almost diaphanous whitish variety is found in Little Stour wood, Wrabness.

This species is distinct from *Helix nitens* and *Helix hispida*; assuming nevertheless, in some respects, the characters of both. Its upper superficies has a dull waxy appearance, thereby differing from either of them. The animal is of a light colour, and emits no unpleasant smell; and the young shells particularly are beautifully striated; which circumstances separate it from *H. nitens;* whilst on the other hand, like that shell, its under surface is whitish and highly polished, and it is found in the same situations. It is not so convex as *H. hispida*, never goes under water, and is of a different colour: yet the young are scarcely discernible from those of that shell.

It occurs in Mons. Draparnaud's work; but as he describes it with four volutions only, whereas it has five, I presume he had not seen it in its adult state.

When Dr. Pulteney tells us that *Helix hispida* is common in woods, does he not intend this species?

48. Helix hispida. *Trans. Linn. Soc. vol.* viii. *p.* 198.

At the edges of the third mill-pond on Porter's Farm, Levington; on pieces of wood submersed in, and at the roots of grass occasionally covered with water by the side of, Baylham pond.

In Essex, on old wooden piles in Ramsey decoy-pond.

This is an amphibious shell, and is frequently found some feet below the surface of water on stakes and piles, upon which it ascends and descends at pleasure.

On the 2d of June 1821, I took a specimen at Ramsey decoy-pond with four eggs adhering to the animal; they were round, white, and opake, resembling the eggs of birds, and retain their form without shrinking.

49. HELIX RADIATA. *Trans. Linn. Soc. vol.* viii. *p.* 199.

Common under pieces of wood and bark in Middlewood Offton, Friston wood, &c.

I have a beautiful pale-green variety without rays from Stour wood, in Ramsey, Essex; and some pale specimens of a larger size (also without rays) from Dinton Hall grounds in Buckinghamshire, a present from Dr. Goodall.

50. HELIX KIRBII.

H. testa nunc subconica nunc subdepressa subpellucida striata, anfractibus quatuor, umbilico patulo.

Habitat sub saxis et lignis.

Testa diametro $\frac{1}{2}$ lin. rufo-cornea; anfractibus subtiliter striatis. Apertura subrotundo-lunata. Labium tenue. Umbilicus profundus.

Found under stones between Baylham and Great Blakenham.

In Essex it occurs in considerable numbers in Stour wood, Ramsey; Glebe grove, Parsonage garden and lawn in Wrabness, under stones and pieces of wood, as well sound as decayed.

This shell had the trivial name of *elegans*, originally given it by me; but that name being pre-occupied by Draparnaud, I hope this beautiful little species will in future be called after one of the best of men, and best of friends, the Rev. William Kirby of Barham.

A friend assures me, that he has examined several specimens I sent him, without being able to discern any difference betwixt them and the *young* of *Helix umbilicata*. But as it never exceeds $\frac{1}{2}$ a line in diameter, whereas the *H. umbilicata* equals $\frac{1}{10}$th of an inch; as it is found in profusion in the above-mentioned places in Essex; and the whorls, four only in number, never appear *ferè disjuncti*, as they do in that shell, which has five whorls, and has

has never been found either in Suffolk or Essex; I must think there is sufficient reason for considering it a distinct species.

Nor is it a new occurrence for one species to bear the greatest resemblance to the *young* of another. Montagu, as my friend Dr. Leach informed me, considered *Helix pellucida* (*Vitrina pellucida* of Draparnaud) to be the young of *H. nemoralis*, yet is it a perfectly distinct shell; and we have seen how nearly allied are the young of different species in what has been said concerning *H. nitidula*.

Is this the *Trochus Matoni* of the Elements of Natural History?

55. HELIX NEMORALIS. *Trans. Linn. Soc. vol.* viii. *p.* 206.

Very common in gardens and hedges.

These shells are found *without*, with *one*, and with *several* dark bands following the course of the volutions; and are accordingly placed as distinct species in my cabinet, although I have not ventured to separate them in this paper. Nevertheless, it may not be amiss to insert my reasons for considering them distinct, as it will lead to the mention of some curious facts and illustrations.

In many places in Suffolk, in my garden at Wrabness, and on an arid sandy common adjoining to Stony-Point, in the parish of Walton in the Naze, I have repeatedly observed the several sorts in copulation, not indiscriminately, as might especially be supposed to be the case at Walton, where they lay by hundreds; but, constantly the *plain sort* (*Helix nemoralis*, mihi) with plain, the *one-banded* (*H. cincta*, mihi) with one-banded, and the *many-banded* (*H. 5-fasciata*, mihi) with its kind. What can this prove, but that the three sorts are as many distinct species?

Another remarkable circumstance may be adduced in proof of this: from the *one-banded* and *many-banded* sorts I have taken the *Spicula* or *Love-darts*; that of the former is four-sided in the

middle and perfectly *straight*; in the latter it is also four-sided in the middle, but *curved* as in *H. aspersa*. The *Spicula* of the *plain sort* I have not been fortunate enough to find; but as they differ in the two former, it is reasonable to suppose they do also in this.

Now to my reasons for considering the three sorts as distinct species, a seemingly decisive argument has been objected, viz. that they have all been produced from *one* deposit of eggs. But has it ever been clearly ascertained that such deposit was made by a single snail?

Being on the subject of *H. nemoralis*, the following passage from Shaw's Travels in Barbary will not I hope be deemed irrelevant; because something similar has been observed in this part of the country by me, tending even to establish (if any thing were wanting) the truth of what that eminent writer advances.

"Those parts of the Sahara," says he, "which these birds (Ostriches) chiefly frequent, are destitute of all manner of food and herbage, except it be some few tufts of coarse grass, or else a few other solitary plants of the *Laureola*, *Apocynum*, and some other kinds, each of which is equally destitute of nourishment, and in the Psalmist's phrase, cxxix. 6. *even withereth afore it be plucked up*. Yet these herbs, notwithstanding this dryness and want of moisture in their temperature, will sometimes have both their leaves and their stalks studded all over with a great variety of *Land-snails*, which may afford them some little nourishment."

In like manner, *parva componere magnis*, on that sandy common at Stony-Point, in Walton in the Naze, above mentioned, the only food which the numerous *Helices* there found can meet with, consists of a few* tufts of hard coarse grass, occasionally

* This was particularly the case in the year 1819. There was much more grass late in the spring of 1821, in consequence of the frequent rains which had fallen.

inter-

intermingled with herbs of as dry a texture. And as in the *Sahara* the variety of Land-snails afford nourishment to the *Ostriches*, so may they here serve in part to sustain the various species of *water-fowls*, which at stated periods resort hither and to the surrounding creeks and marshes in great abundance; for, as some water-fowls (*Eider* and *Scoter Ducks*, for instance,) feed on the animals of water-shells, others may do so on the land-shells.

One observation more respecting the Walton *Helices* may perhaps be thought worthy to be mentioned; viz. that lying exposed to the sun, with scarcely any shelter, a great proportion of them have their upper surfaces more or less tinged with a beautiful pink or rose colour; and that this colour is really occasioned by the sun is the more probable, their under parts retaining that which is natural to them.

56. Helix hortensis. *Montagu Test. Brit. p.* 412.
H. nemoralis *ϑ*. *Trans. Linn. Soc. vol.* viii. *p.* 207.

Frequent in hedges at Offton, Holbrook, Higham, Stoke by Nayland, and Ipswich; in Friston wood.

Of much rarer occurrence in Essex, but is occasionally found in Ramsey near the Stour; and in hedges bordering the Harwich road, near Dovercourt turnpike gate.

Young shells, when minute, are scarcely to be distinguished from those of the preceding species.

The *H. hortensis*, as well as the preceding, is divided into the *plain*, the *single-banded*, and the *many-banded*, each of various colours; and if future observation should prove that *they* confine their amours to their respective kinds, and that their *Spicula* are different, then ought *they* also, in my opinion, to be established as distinct species.

59. He-

59. HELIX OBSCURA. *Trans. Linn. Soc. vol.* viii. *p.* 212.

On dry banks near Ipswich and at Spexhall; and on trunks of trees in Friston wood and Middlewood Offton.

In Essex, it inhabits my garden and adjoining fences; West grove, Little Stour wood, and Cliff, all in Wrabness.

These shells, particularly in their young state, show great sagacity and ingenuity by covering themselves with an epidermis adapted to the different situations in which they are found; and when so covered, it is almost impossible for any other than a conchological eye to detect them. If its abode be upon the trunk of a tree covered with *Lichens*, then is the epidermis so constructed as to cause the shell to resemble a little knot on the bark covered with such substances. If on a smooth tree, from whose bark issue small sessile buds, as is frequently the case, it will pass off very well for one of them; and on a dry bank, or the lower part of the body of a tree splashed with mud, its appearance will be that of a little misshapen, pointed piece of dirt.

60. HELIX LUBRICA. *Trans. Linn. Soc. vol.* viii. *p.* 213.

In moss, and under stones, pieces of wood and bark in moist woods and shady places.

Draparnaud refers this species to *Helix subcylindrica* of Linnæus: if he be right, then must Linnæus have been greatly deceived, who says, "*habitat in aquis dulcibus.*" But in my opinion he is in an error as to the Synonym, for the *H. subcylindrica* of Linnæus has only four anfractus, whereas the *H. lubrica* has six.

With respect to the *H. subcylindrica* of Dr. Pulteney, the learned authors of the *Descriptive Catalogue of the British Testacea* assure us* that it is the *Turbo truncatus*, a sea shell.

* *Trans. Linn. Soc.* viii. *p.* 177.

61. HE-

61. HELIX PUTRIS.

Helix succinea. *Trans. Linn. Soc. vol.* viii. *p.* 218.

Very common upon water plants by the sides of rivers and ponds.

They are of an unusually large size at Campsey Mere. This is the *Helix putris* of Linnæus, Montagu, and Donovan; but the *H. succinea* of Dr. Maton and Mr. Rackett, which last authors use the following words, "Linnæus describes *H. putris* as '*obtusa*,' and '*mucrone obtusiusculo*,' characters which do not belong to *H. succinea*."

Now, with all deference, I affirm that those characters given by Linnæus to *H. putris* are exactly applicable to the *H. succinea* of Dr. Maton and Mr. Rackett, and that during twenty years diligent investigation of the Land and Fresh-water Shells, I never found a specimen to which they did not apply.

I must add that Draparnaud, in his List of Synonyms, rightly refers his *Succinea amphibia* to the *H. putris* of Linnæus.

64. HELIX FOSSARIA. *Trans. Linn. Soc. vol.* viii. *p.* 217.

In a pond at Claydon; in Holbrook and Stutton streams; and in the river Stour at Higham.

A curious whitish variety is found at Levington, on Harper's cliffs, under stones where a little water has collected. Another variety I have taken in Holbrook stream, in which the volutions are more oblique than usual; there is in fact as much difference betwixt it and the true *H. fossaria*, as between *H. stagnalis* and *H. fragilis*: the two lower volutions are also longitudinally and transversely crossed with whitish *striæ*.

Very abundant in Essex, particularly in the garden pond at Wrabness Parsonage.

It

It is the *Limneus ovatus* of Draparnaud, who erroneously identifies it with the *H. limosa* of Linnæus.

65. Helix limosa. *Linn. Syst. Nat. ed.* xii. *vol.* ii. *p.* 1249.
Helix putris. *Trans. Linn. Soc. vol.* viii. *p.* 219.

In abundance in most rivers, marsh ditches, and ponds.

Draparnaud has made two species of it, viz. *Limneus peregra* and *L. ovatus*. It is the *H. peregra* of Montagu, and *H. putris* of Dr. Maton and Mr. Rackett; so that it would appear that the *H. limosa* of Linnæus was unknown to modern Conchologists.

But surely there is no occasion for the trivial names *succinea* and *peregra*;—with me, at least, there is the strongest conviction, that as *H. succinea* of Dr. Maton and Mr. Rackett is the *H. putris* of Linnæus; so also is the *H. putris* of those authors and the *H. peregra* of Montagu the true *H. limosa*.

It must be observed that this species is frequently found with five volutions, in which state Linnæus described it. I have specimens from Mrs. Cox's pond in Wrabness, which equal one inch two lines and a half in length; and a curious variety from the pond below Ramsey Decoy, in which the margin is so extremely dilated as to give the lowest volution the appearance of a huntsman's cap.

66. Helix auricularia. *Trans. Linn. Soc. vol.* viii. *p.* 221.

In Campsey Mere and Holbrook stream; and at Baylham, below the Fall in the Back-water of the River Gipping belonging to Sir William Middleton, Bart.

I have a dwarf variety from the pond in Fearis' wood in Beaumont, Essex. Also two fine varieties from the stream between Langford Fleet and the River Trent, Notts,—in one of which the inside is purplish; in the other, of a delicate silvery white, and the margin is considerably dilated.

67. He-

67. HELIX LUTEA. *Trans. Linn. Soc. vol.* viii. *p.* 222.

A specimen was found some years since on the banks of the River Gipping at Sproughton, by my venerable friend the Rev. James Lambert, of Trinity College, and formerly Greek Professor in the University of Cambridge. This circumstance, combined with my having taken abundance of them at Winthorpe, on the banks of the River Trent, Notts. (after a flood) at least thirty miles above its junction with the salt water, proves *H. lutea* to be a *fresh-water* shell. Those found therefore by Montagu *ad littora maris* must have been carried down to the sea by some fresh-water stream, and afterwards thrown on the shore. I have never taken it in a living state. It probably inhabits the depths of rivers.

68. HELIX PELLUCIDA. *Penn. Brit. Zool. vol.* iv. *no.* 134.

Inhabits the Parsonage garden at Offton, and the grove in which *H. Somershamiensis* is found; plentiful also at the roots of grass in the marsh within the Sea-wall at Shotley.

In abundance in moss and under pieces of wood in Little Stour wood, my garden and lawn, Wrabness, Essex.

This is the *Vitrina pellucida* of Draparnaud; a very distinct species, but bearing some resemblance to the *young* of *H. nemoralis* and *H. hortensis*.

This shell varies as to the colour of its suture; in some it is whitish and more wrinkled than in others; in some it is brown; whilst in others the brown, in particular lights, appears to be gilded.

The green colour of the shell is also of various hues; and young specimens are whitish, and have only two, or scarcely two, volutions; so that I think it is manifest that Draparnaud has multiplied one species into three.

The *animal* sometimes appears too big for its habitation, in one instance greatly exceeding it; and will occasionally cover it *pallio gelatinoso*. Its upper part is of a light colour with black head and horns; under part light-coloured, bordered with black. Air-valve, when closed, a black spot; when open, surrounded with a black ring.

I have always considered this shell as the *H. pellucida* of Pennant (to which Dr. Maton and Mr. Rackett have referred *H. nitens*); and Draparnaud bears me out in that opinion, by referring his *Vitrina pellucida* to the *H. pellucida* of Müller.

Wrabness Parsonage, Essex,
May 16, 1822.

XII. *A Commentary on the Second Part of the Hortus Malabaricus. By Francis Hamilton, M.D. F.R.S. and L.S.*

Read April 1, 1823.

KAIDA, *p.* 1, *fig.* 2, 3, 4, 5.

IN the reference to the figures prefixed to the text, the 1st plate is also quoted for the *Kaida*; but on the plate itself it is marked *Kaida Taddi*; and, that this is no mistake, is clear from the figure. Plate 2. represents the lower part of a branch, Pl. 3. represents the upper part of a branch, or young shoot, Pl. 4. the male flower, and Pl. 5. the female flower and fruit.

The first four plants described in this volume form a genus of a singular appearance, which Rheede called *Kaida*, probably from some mistake, as Rumphius (*Herb. Amb.* iv. 141.) says that the name was unknown to such of the natives of Malabar as he consulted, who called these plants *Dare*. *Kaida* however may be derived from the Arabic Kadhi, a colony from Arabia, under the name of Moplay, having been very long settled in Malabar.

Before the time of Rheede this singular genus was confounded by botanists with the *Ananas*. Ray, however, seems to have been dissatisfied with this classification, but did not attempt to class it further than by calling it *Frutex indicus*. Plukenet at first (*Alm.* 277.) attempted another classification, calling a species, which he had received from Alexander Brown, *Palmæ*

affinis arbor conifera. He seems however soon afterwards to have become sensible, that this classing it with the Palms was erroneous; and, instead of imitating Rheede, returned (*Amalth.* 13.) to the old name of J. Bauhin, *Ananas sylvestris, folio aloes, fructu cupressino.*

Rumphius (*Herb. Amb.* iv. 13.) clearly perceived, that such rude attempts at classification were not tenable; and, while he rejected the *Kaida* as of doubtful origin, he adopted *Pandanus* from the Malay language, and described at least twelve species of this genus, besides adding to it some plants that must be referred to another quarter.

The elder Burman, notwithstanding he had before his eyes the works of Rheede and Rumphius, contrived (*Thes. Zeyl.* 20.) to confound this genus with the *Ananas*, and refers to the description of the *Bromelia* by Linnæus for an excellent account of its generic characters! This indeed may be considered as the most unfortunate classification ever adopted by this great botanist; for in the *Flora Zeylanica* (*p.* 131.) he implicitly followed the elder Burman, as the younger Burman again followed him (*Fl. Ind.* 79.). This genus of plants continued thus unnaturally connected, until Forskahl, meeting probably with the species which Plukenet had received through A. Brown from Arabia, gave its proper generic characters under the name *Keura.* Shortly afterwards Forster gave this genus the name *Athrodactylis;* and the younger Linnæus, convinced of his father's error, with great propriety restored the name *Pandanus* given by Rumphius, and now generally followed.

Although all botanists now clearly perceived that this was a distinct genus, yet Jussieu, when he published his *Genera Plantarum*, was at a loss in what natural order it should be placed; and, like Plukenet in his first conjecture, considered it as having an affinity to the *Palmæ.* M. du Petit-Thouars, who has added largely

largely to the species of this genus, considers it as having no considerable affinity to any other family of plants (*Enc. Meth. Sup.* i. 575.). Mr. Brown in his valuable work on the plants of New Holland (i. 340.) does not differ from M. du Petit-Thouars; for, although he has an order of *Pandaneæ*, this order consists of only two genera. He places this indeed next to the *Aroideæ*, and allows a certain similitude between these plants; but the genera of the *Aroideæ*, which have most resemblance to the *Pandanus*, that is those in the third section, Mr. Brown has not placed nearest to the *Pandaneæ*, to which in my opinion they bear a much closer affinity than they do to the *Aroideæ* of Jussieu. This third section of Mr. Brown constitutes the *Typhæ* of Jussieu, a natural order, which in my opinion should be preserved; and to this, I have no doubt, should be added the genus *Pandanus*, which bears an affinity to the *Sparganium* among the *Typhæ*, nearly as strong as the *Bambusa* does to the *Avena* among the *Gramineæ*. Natural orders, in my opinion, must be founded on general resemblances, taking into consideration the structure of the whole vegetable; and I regret, that the best botanists of late have given too much importance to minute differences in the structure of parts, which, however important in the propagation of the species, are so minute and inconsiderable as to deserve little attention, unless accompanied by a general resemblance. This is no doubt often the case; but then this general resemblance, of itself, is what should constitute the difference, whether accompanied by these minutiæ or not. Besides, in the present state of science, it seems rash to exclude certain plants from a natural order, because in some of these minutiæ they differ from some species that have been examined; while in by far the greater part of the order it has not been ascertained how far the minute structure extends. Let it not be imagined, from what I have now stated, that I undervalue the minute examina-

tion which my esteemed friend Mr. R. Brown has bestowed on the vegetable kingdom. It is only by extending such examination much further, that the real value of each distinctive character can be ascertained; but, until this has been accomplished, I doubt the propriety of introducing so many new natural orders as has been done of late. I could rather indeed wish to see several of Jussieu's orders united into one, than to have each torn into portions that deserve only to be called genera.

Having thus premised what appears to me necessary for explaining this genus called *Kaida* by Rheede, I must now proceed to examine his four species, all of which his commentator Commeline considered as having been previously unknown to botanists. Perhaps he was so far right, that the accounts previously given were so incomplete, that the notices contained in former writers could only be considered as belonging to the genus, and not sufficient to ascertain the species which had been seen.

The *Kaida* however of Rheede is justly entitled to be considered the prototype of the genus, and therefore, as usual among the Hindus, is not marked by a specific name. It is entitled to this pre-eminence by the great fragrance of its male flowers, which renders it always in request with the natives of India; and it is likely to have been shown by them to the curious from Europe, as one of their most interesting vegetables. On this account I should suspect that this is probably the *Ananas bravo* of Acosta, the *Arbor fructu Ananas ex caudice emergente, nucleis turgente* of C. Bauhin, and the *Ananas sylvestris, folio aloes, fructu cupressino* of J. Bauhin, and almost certainly the *Frutex indicus fructu aggregato conoideo Kaida dicta* of Ray; although, not being able to consult these authors at present, I do not know what objections there may be to this opinion.

Plukenet, having received from southern Arabia a species of this

this genus, which he called *Palmæ affinis arbor conifera Mascatensis, longissimo folio, tribus ordinibus spinarum munito*, at first (*Alm.* 277.) considered it as the same with the *Kaida*, and with the plant of Ray already mentioned; but on further consideration (*Mant.* 145.) he questions if his plant be not rather the *Kaida Taddi*, next to be described. As the fruits of the two plants cannot be mistaken, and are the only parts, except the male flowers, likely to be preserved in a dry specimen, we may I think infer that he was at first mistaken, and that his plant was not the *Kaida*: yet still afterwards (*Amalth.* 13.), when he acknowledged his error in classing it with the *Palmæ*, he adopts the name of J. Bauhin, already mentioned as probably belonging to the *Kaida*.

Rumphius, who described at least twelve species of this genus, in describing the *Pandanus verus*, says (*Herb. Amb.* iv. 241.), "In *Horto Malabarico* quatuor hujus plantæ exhibentur species, nulla autem omnino convenit cum *Pandano* nostro, excepta prima species, seu vera *Kaida*, quæ *Pandano* nostro vero accedit, Malabarensis vero folia multo sunt longiora." And again he says (*p.* 141.), "Acosta folia florem cingentia scribat nimis lutea, fructus eleganter rubros et melonum magnitudinem habentes, atque quod ex cunctis vulneratis ramis et trunco copiosus exstillet liquor, quæ omnia forte in Malabarensi et Indostano *Pandano* vera sunt, in Amboinensi autem et Moluccensi non obtinet, neutiquam tamen pro diversis habeantur plantis. *Pandanus* enim fere in omni variat insula." Finally, he further says, "In Amboina *Pandanus* verus non multum obcurrit; quique ibi reperitur debilem fundit odorem, neque flores tam bonæ notæ ac durabiles sunt quam in aliis locis." From these circumstances, as this is not a cultivated plant liable as such to many variations, I would draw a conclusion different from that of Rumphius, and conclude, that although under the name *Pandanus*

nus verus he may have meant to describe the highly odorous *Kaida*, which is no doubt found in many islands of the eastern archipelago, yet he described in fact an inferior species found in Amboina, and which may readily be distinguished from the *Kaida* by the size of the fruit, and by the structure of the drupa; for he says (*p.* 139.) "fructus magnitudinem habet mali aurantii, sed oblongior est.—In centro cujusvis pyramidis (drupæ) foraminulum tanquam porus conspicitur, ubi et brevis adparet apex." Now Rheede says, "Fructus oblongo-rotundi sunt et prægrandes—in singulis tuberculis (druparum apicibus) tribus aculeatis, lignosis papillis muniti:" and in fact in fig. 5. the fruit is represented as large as the pine-apple (7 inches long by $4\frac{1}{2}$ thick), with three large pores on the end of each drupa, each pore being placed in a projecting tubercle. We may therefore safely infer, that the plant of Amboina, actually described by Rumphius, is not the *Kaida*, although much of what he says concerning the *Pandanus verus* probably belongs to the highly odorous plant of other islands, which is probably not different from that of Malabar.

The elder Burman considered the plant of Amboina, described by Rumphius with a fruit like an orange, as being the same with the *Ananas sylvestris arborescens* of Acosta, with a fruit like a melon, and as being the *Kaida Taddi* of Rheede, not his *Kaida*. But the *Kaida Taddi*, as I shall have occasion to show, is rather the *Pandanus spurius* of Rumphius. The elder Burman was probably misled by Plukenet in giving his plant to the *Kaida Taddi*: very little dependence can however be placed on his authority, especially as he adds to the synonyma an American plant, the *Nana brava* of Marcgrave, probably a real *Bromelia*. It would be impossible, therefore, on the authority of the elder Burman, to say what the *Wætkakeiya* of the Ceylonese is.

Linnæus,

Linnæus, however, misled by Burman, described the *Wætkakeiya* of the Ceylonese as *Bromelia foliis margine dorsoque aculeatis, caule fulcrato spinoso* (*Fl. Zeyl.* 14.); but he gives the synonyma with more care, joining the plant of Acosta and those of J. Bauhin and Ray, that I have already mentioned, with the *Kaida* (misprinted *Kaidi*) of the *Hortus Malabaricus*. With respect to Plukenet, he was probably wrong, as that botanist considered the *Kaida Taddi* to be more like his plant; but, respecting Acosta, J. Bauhin and Ray, Linnæus was probably right in joining their plants with the *Kaida*. In the reference, however, to the plates, he has been misled by the text to consider fig. 1. as representing this plant; an error that has been generally since followed. Linnæus was also probably misled by Burman to quote among the synonyma the *Carduus brasilianus sylvestris* of C. Bauhin, probably the same with the *Nana brava* of Marcgrave.

The younger Burman, although he rejected this, did not improve the synonyma of the *Bromelia sylvestris*, as the plant was now called (*Fl. Ind.* 79.); for he added the *Pandanus verus* of Rumphius, which, as I have said, is neither the *Kaida* nor *Kaida Taddi*; and, in imitation of Plukenet and his father, he adopted the *Kaida Taddi* (misprinted *Kauda*) in preference to the *Kaida* chosen by Linnæus.

Since later botanists have obtained a more perfect knowledge of the fructification, and removed this plant from among the *Bromelias* to its proper place as a distinct genus, no great improvement has taken place in the synonyma. The compiler of the *Encyclopédie* was perhaps justified, on account of the imperfect nature of their accounts, in leaving out altogether the synonyma of older botanists: but the *Pandanus odoratissimus* with him is both the *Pandanus verus* and the *Kaida*; and it is also the *Keura odorifera* of Forskahl, which, coming from Arabia, is probably

probably the same with the plant of Plukenet, more likely to resemble the *Kaida Taddi* than the *Kaida*. The *Athrodactylis spinosa* of Forster is more probably the *Kaida*. Willdenow (*Sp. Pl.* iv. 645.) makes no considerable change on these synonyma, only he adds references to several valuable modern accounts of the plant, leaving us still however in the dark, whether he meant the *Pandanus verus* of Amboina, or the *Kaida* of Malabar. In the *Hortus Kewensis* (v. 351.) both are omitted as uncertain; and the only authority quoted is Dr. Roxburgh, who does not quote the *Kaida* (*Hort. Beng.* 71.), although I believe it was the plant he described; but I think that he was deterred from quoting it by the reference in the text to fig. 1.

KAIDA TADDI, *p.* 3. *figs.* 1 *and* 6.

Much of what I had to say concerning this plant has been anticipated in treating of the last; and I have fully explained, how alternately with the *Kaida* it has been considered as the same with the *Ananas arborescens*, or *Bromelia sylvestris*, or *Pandanus odoratissimus*, as at different times it has been called. Plukenet, who compared specimens of the Arabian plant with the accounts of Rheede, seems to think that it most resembled the *Kaida Taddi;* and, if he saw the fruit, he could not be mistaken. We may therefore with some degree of confidence refer to the *Kaida Taddi* the *Palmæ affinis arbor conifera Mascatensis longissimo folio tribus ordinibus spinarum munito* (*Pluk. Alm.* 277; *Mant.* 145; *Amalth.* 13.); and this, again, from the country where it was found, is not unlikely to be the *Keura odorifera* of Forskahl, although both plants may grow in Arabia as well as in India.

At first sight, it would not seem clear whether or not Rumphius described the *Kaida Taddi*. The fruit delineated in the 75th plate of his 4th volume has indeed no resemblance; but then this

this figure has no resemblance to the description of the *Pandanus spurius*, which it is said to represent; for in this description we have as follows: "Maturus fructus vero in multa aperitur ac dehiscit segmenta, quorum quodvis ex variis constat pyramidibus (drupis), quæ non separantur nisi vi." This, in my opinion, clearly points out that the *Pandanus spurius* has a fruit resembling that of the *Kaida Taddi;* and therefore, although it is quoted both by Willdenow (*Sp. Pl.* iv. 645.) and by M. Lamarck (*Enc. Meth.* i. 372.) as a mere variety of the *Pandanus odoratissimus*, I can have no doubt that it is the *Pandanus fascicularis* of these authors (*Sp. Pl.* iv. 640.; *Enc. Meth.* i. 372.); unless it should appear that, besides the *Kaida Taddi*, another species is provided drupis fasciculatis. It is true that Rumphius, in plates 80 and 81, represents a plant with such a fruit; and in the explanation of these plates this is called *Folium Baggea maritimum*, described in page 151. In this description, however, there is no hint given of the drupæ separating into clusters as the fruit ripens; and I strongly suspect, that a transposition has taken place, and that plates 80 and 81 represent the *Pandanus spurius*, while plate 75 represents the *Folium Baggea maritimum*. It seems owing to this difference between the description and the appearance of the fruit in plate 81, that M. Lamarck quoted (*Enc. Meth.* ii. 372.) the *Folium Baggea maritimum* with doubt for the *Pandanus fascicularis*. If this conjectured transposition has actually taken place, every doubt of the *Pandanus spurius* being the same with the *Kaida Taddi* will be removed, and the plates in Rumphius will agree with the descriptions.

PERIN KAIDA TADDI, *p.* 5. *fig.* 7.

This is evidently a distinct species of *Pandanus*, not yet quoted by modern authors.

KAIDA TSIERREA, *p.* 7. *fig.* 8.

This continued unquoted by modern authors, until Dr. Roxburgh received plants from his son in Chatigang; and it is mentioned in the *Hortus Bengalensis* (71.) under the name of *Pandanus furcatus*. Rumphius indeed (*Herb. Amb.* iv. 149.) supposed it to be his *Pandanus ceramicus montanus*; but I cannot see any resemblance between the figure in Rheede and the description in Rumphius, for he gives no figure; and I rather suspect that his plant is the *Millore* of the Nicobar islands (*As. Res.* iii. 161.), a magnificent plant, which I have seen in the garden of the late worthy Dr. James Anderson of Madras; and doubtless different from the *Pandanus odoratissimus*, with which Dr. Roxburgh seems inclined to class it.

PANEL, *p.* 9. *fig.* 9.

Plukenet (*Mant.* 139.) only mentions this plant to say, that it has no affinity with the *Nimbo* of Acosta (now called *Melia Azadirachta*), as Commeline asserted: but Commeline says nothing of the kind. He indeed compares the *Narum Panel*, next to be mentioned, with the *Nimbo*; but he says that the *Panel* is quite different. I cannot find that the *Panel* has been since mentioned by any author. Notwithstanding its simple leaves, it has very much the general appearance of the *Limonia pentaphylla* of Willdenow (*Sp. Pl.* ii. 572.), and probably belongs to the same genus with that plant, which scarcely can be considered as being of the same family with the *Limonia acidissima* of Linnæus, the prototype of the genus. By the *Limonia acidissima* of Linnæus, I mean the *L. crenulata* of Dr. Roxburgh, who, misled by Kœnig, took the *anisifolia* of Rumphius for the *Limonia acidissima*, and therefore described the *Tsjeru Catu Naregam* as a new species: but when Linnæus (*Fl. Zeyl.* 175.) first

first constituted the species, since called *Limonia acidissima*, he meant the plant of the *Hortus Malabaricus*, nor did he then quote the work of Rumphius.

NARUM PANEL, *p.* 11. *fig.* 10.

Nothing well could be a more rude classification than the reckoning this of the same genus with the preceding plant, except that of Commeline in comparing it with the *Nimbo* of Acosta, now called *Melia Azadirachta*, as Plukenet justly observed (*Mant.* 139.).

The elder Burman (*Thes. Zeyl.* 231.), with a classification scarcely less objectionable than that of Commeline, called this plant *Uva zeylanica, sylvestris, Mali armeniacæ sapore, Uves de Mato Lusitanis;* and considered it as the same with the *Palukena* of Herman. Ray, not knowing any plant with which it could be compared, did not give it a proper name, but called it *Frutex baccifer fructu ad singulos flores multiplici.* Linnæus early perceived (*Fl. Zeyl.* 224.) that this could not be reduced to any genus then known; and therefore, giving its characters at full length (*l. c. App.* 11.), called it *Uvaria*, from the resemblance to a grape, which had been noticed by Burman. He retained exactly the synonyma that have been already mentioned.

In the *Flora Indica* (124.) of Burman we find an addition made to the synonyma, by annexing the *Funis musarius* of Rumphius (*Herb. Amb.* v. 78.), although that excellent botanist under this name includes two plants, which very likely do not belong to the same genus with each other. The *Funis musarius latifolius*, which is represented in plate 42, is no doubt an *Uvaria*, which I have examined; but I do not think that it is the same with the *Narum Panel*, which is now called *Uvaria zeylanica* (*Burm. Fl. Ind.* 124. *Willd. Sp. Pl.* ii. 1261. *Enc. Meth.* i. 596. *Hort. Kew.* iii. 333.) Whether Burman, Willdenow and

Lamarck really meant the *Narum Panel* or the *Funis musarius latifolius* by their *Uvaria zeylanica*. I cannot say; but in the *Hortus Kewensis* Rheede alone is quoted. Dr. Roxburgh, who does not seem to have seen the *Narum Panel*, described a species of *Uvaria*, which he had received from Sumatra, and called it *U. grandiflora*. In the *Hortus Bengalensis* (43.) he quotes no synonyma; but I compared his plant with one which I found in the N.E. parts of Bengal, and which I have no doubt is the *Funis musarius latifolius*, and it is quite different from the *Narum Panel*. This difference did not escape the notice of M. Dunal in his treatise on the *Anonaceæ* (*Enc. Meth. Supp.* v. 779.), where he quotes, by the proper name, the *Funis musarius latifolius* for his *Unona musaria*: but he errs in calling it an *Unona*, as it is undoubtedly of the same genus with the *Narum Panel*, the prototype of the genus *Uvaria*. The synonyma, given by Linnæus in the *Flora Zeylanica*, for the *Narum Panel*, so far as relates to the older writers, without addition or alteration, are therefore correct; and I shall now add a description, which I took in Malabar, where I found the plant flowering in December 1800.

Frutex scandens ramulis teretibus, glabris. *Folia* alterna, bifaria, ovato-oblonga, integerrima, utrinque acuta, utrinque nitida, venosa, plana. *Petiolus* teres, canaliculatus, brevissimus, stipulis nudus. *Pedunculus* prima facie terminalis videtur, sed prodeunte surculo revere oppositifolius, solitarius, petiolo triplo longior, uniflorus, teres, nudus. *Flores* nutantes, magni, virides. *Calyx* patentissimus, coriaceus, 3- vel 4-fidus laciniis subrotundis, concavis. *Petala* 6 seu 8 duplice serie posita, basi coalita, ovata, concava, acuminata, coriacea, subæqualia. *Antheræ* plurimæ, angulatæ, imbricatæ peripheriam receptaculi hemisphærici tegunt. *Germina* plura, antheris similia, centrum receptaculi occupant.

Baccæ

Baccæ plures receptaculo subrotundo pedicellis mediocribus insidunt oblongæ, utrinque obtusæ, 5- seu 6-loculares. *Loculi* monospermi, uno super alterum posito, septis transversis tenuissimis discreti. *Seminum* albumen rimis profundis transversis incisum.

Cara Nosi, *p.* 13, *fig.* 11.

Bem Nosi, *p.* 15, *fig.* 12.

The earliest botanists, who treated of Indian plants, such as Acosta and Garcias ab Horto, called these shrubs by the name *Negunda* or *Negundo*, the origin of which is rather doubtful. Rheede indeed says, that it is the name given by the Brahmans of Malabar; but in this I suspect some mistake, as in general they use either Sanscrit or Hindwi names, and these plants are called *Sindhuka* and *Nisinda*, in the sacred and vulgar dialects of Gangetic India. We might, I think, agree with Rumphius (*Herb. Amb.* iv. 48.) in considering *Negundo* as a vulgar name, that is one originating in mistake, and not derived from any known language, unless it be a corruption of the Malay word *Lagundi*, which is not improbable, L and N being interchangeable letters.

By these early writers the *Negundo* was divided into two kinds, male and female, not distinguished by the one producing only flowers, and the other fruit also, but from the one being considered most pregnant with medical virtues. The *Cara Nosi* was reckoned the male, and the *Bem Nosi* the female.

Caspar Bauhin endeavoured to distinguish these two kinds by their size, calling the female *Vitex trifolia major*.

Plukenet, in imitation of Breynius, endeavoured to distinguish these two kinds by the margins of their leaves, calling the female *Vitex trifolia minor Indica*, and the male *Vitex trifolia minor Indica serrata* (*Alm.* 390.); but this is founded on error, as Rumphius

phius justly remarks (*Herb. Amb.* iv. 48.) "Dicimus, maximam foliorum partem non serratam esse et semper ternatam; si vero hic fruticulus sæpius detruncetur, in surculis folia non tantum hinc inde sunt solitaria, sed etiam ad oras parum serrata, seu profunde dentata, ut una eademque habeatur planta cum illa, quæ in aliis Indiæ locis crescit, et a Portugallicis scriptoribus describitur folia gerere serrata."

Although Plukenet was thus unfortunate in selecting a specific distinction, he was perfectly right in following C. Bauhin, and placing the *Negundos* in the same genus with the *Vitex* or *Agnus castus*, notwithstanding an attempt made in the Medical Garden of Amsterdam to class it with some African plants related to the genus *Rhus* (*Mant.* 161.). What is of more importance, he gives us a figure of the *Negundo mas* (*Phyt. t.* 206. *f.* 5.), which strongly resembles the *Cara Nosi*.

The elder Burman, without materially altering the synonyma, changed the specific distinction, calling the *Cara Nosi Vitex trifolia, Indica, odora, hortensis, floribus cæruleis, racemosis;* and the *Bem Nosi Vitex trifolia, odorata, sylvestris, Indica,* (*Thes. Zeyl.* 229.); where the real distinction is, that the one plant is cultivated, and the other wild.

Notwithstanding the example of C. Bauhin, Plukenet, and Burman, Linnæus, when he published the *Flora Zeylanica* (*p.* 413, 414.), considered the genus of these plants as doubtful; but mentioned them among the *obscuræ* under the names given by Burman, with the synonyma of preceding authors taken from the same source: so that in this work the only distinction is that the one plant is wild and the other cultivated.

Rumphius (*Herb. Amb.* iv. 48, 50.), in imitation of other botanists, describes two species, the *Lagondium vulgare*, and *litoreum;* the first analogous to the *planta fœmina, minor, integerrima, et hortensis;* and the second analogous to the *planta mas, major,*

major, serrata et sylvestris of preceding authors. On comparing every thing that he says, respecting the above-mentioned distinctions, I cannot perceive that they afford any sufficient reason for considering the plants as distinct species: but he has a remark, which, were it accurate, might afford room for a real distinction, which will appear evident, if we compare what I have already quoted from Rumphius, concerning the leaves of the *Lagondium vulgare*, with what follows concerning those of the *L. litoreum*. "Folia plerumque quinque simul locata sunt, —quorum bina inferiora tempore decidunt, unde in ramis floriferis et frugiferis ternata tantum semper sunt, in surculis vero semper quina sunt." Now in the *Lagondium vulgare*, "folia semper sunt simplicia vel ternata."

Linnæus however, in his first edition of the *Species Plantarum*, followed by the younger Burman (*Fl. Ind.* 137, 138.), rejects altogether this distinction of Rumphius; and, although he adds the *Lagondium vulgare* as synonymous with the *Cara Nosi*, which he calls *Vitex trifolia*, and the *Lagondium litoreum* as synonymous with the *Bem Nosi*, which he calls *Vitex Negundo*, he attributes to both "folia ternata quinataque," and returns to the old distinction of "foliola integerrima and f. serrata," which I know to be totally futile, as leaves of both descriptions may usually be observed on the same individual plant. He adds however another distinguishing mark, namely that the *Vitex trifolia* has *panicula dichotoma*, and the *Vitex Negundo flores racemoso-paniculati*. I do not think, however, that either term is strictly applicable to the plant, which I have seen, although as corrected by Mr. R. Brown (*Nov. Hol.* i. 512.) "paniculæ rachis stricta, rami subdichotomi," the term is applicable to the *Vitex* common about the hedges of India. Burman adds, as a variety to the *Vitex trifolia*, the *Vitex trifolia floribus per ramos sparsis*

sparsis of his father (*Thes. Zeyl.* 229. *t.* 109.), which does not seem to me to be a *Vitex*.

M. Lamarck returns to the distinction of Rumphius, characterizing the *Cara Nosi* or *Lagondium vulgare* by its having *folia simplicia ternataque subintegerrima*, and the *Vitex paniculata* (*Enc. Meth.* ii. 612.) as having *folia quinata integerrima:* but then this plant, although it is the *Lagondium litoreum* of Rumphius, is not the *Bem Nosi* of Rheede, which M. Lamarck considers as a mere accidental variety of the *Cara Nosi*, and therefore excludes altogether the *Vitex Negundo*, as a species. I must say however, that the *Vitex* which grows so common, and half wild, in the hedges about gardens and villages, just like the *Sambucus nigra* in Europe, has leaves simple, ternate, and quinate, entire and serrated; and it must be observed, that Rheede says of the *Bem Nosi*, *folia in petiolis terna et passim quina*. I agree therefore with M. Lamarck in thinking the *Cara Nosi* and *Bem Nosi* mere accidental varieties of the same species, to which should be referred the *Lagondium vulgare* of Rumphius. As however M. Lamarck has seen specimens both in flower and fruit of another species, which he considered as the *Lagondium litoreum*, I have little doubt of Rumphius having been in an error, when he compared his plant to the *Bem Nosi*, and that this error misled Linnæus into the mistake of distinguishing as species the *Negundo mas et fœmina*.

Notwithstanding the observations of M. Lamarck, Willdenow, who never saw the plant, joins the *Vitex paniculata*, or *Lagondium litoreum*, with the *Bem Nosi* and all its concomitant synonyma, as given in the *Flora Zeylanica* (*p.* 414.), and thus retains the *V. Negundo:* yet in the annexed observation he admits that the *V. trifolia* has *folia subtus tomentosa*, and the *V. Negundo folia subtus nuda;* while the very name *Bem*, as Rheede observes, implies

plies *white*, and has been given to this variety, because its leaves have more of that colour (depending no doubt on more white tomentum) than those of the *Cara Nosi*. I am inclined however to believe, that Linnæus actually saw specimens of the *Lagondium litoreum*, and that this is the plant which he meant to describe as the *V. Negundo*, although he may have erred in joining it with the *Bem Nosi*. New specific characters however are wanted to distinguish these plants, those yet given being founded on circumstances liable to vary even in the same individual: but I am not prepared to enter on this subject, having only seen one of the species.

After all, I must however confess that the figure of the *Lagondium litoreum*, and that given by Plukenet (*Phyt. t.* 321. *f.* 2.) of the *Vitex orientalis angustis foliis, semper tripartito divisis* (*Alm.* 390.), which is quoted in the *Encyclopédie* as being the same with the *Lagondium litoreum*, has a stronger resemblance to the plant common about the villages of India, than the figure of the *Lagondium vulgare*, or the figure of the *Vitex trifolia minor* of Plukenet, or than either figure in the *Hortus Malabaricus*. Notwithstanding therefore all that I have said, I do not consider that I have removed all the difficulties on this subject. Specimens of the plant common every where in India have been presented to the East India Company's collection. It is undoubtedly the *V. Negundo* of Dr. Roxburgh (*Hort. Beng.* 46.); and it must be observed, that he received from Pegu a plant, which he considered as the *Vitex trifolia*, as agreeing with the figures of the *Lagondium vulgare* and *Cara Nosi*. So far as relates to the mere figures, this is agreeable to what I have last stated; but, if this should be adopted, we must transfer most of the synonyma mentioned by Linnæus in the *Flora Zeylanica* to the *Vitex Negundo*; and in this case, I must confess that I have never seen

the *Vitex trifolia*, under which name I have sent the plant common in India to the Company's collection.

Schetti, *p.* 17. *fig.* 13.

Commeline considered this plant as unknown to botanists, until described by Rheede: but it was soon adopted into the system by Breynius, Hermann, and Plukenet, who joined Hermann in calling it *Jasminum indicum lauri folio inodorum, umbellatum, floribus coccineis* (*Alm.* 196. *Phyt. t.* 59. *f.* 2.). The elder Burman (*Thes. Zeyl.* 125.) to these adds synonyma from Ray and the *Herbarium Amboinense*, then unpublished; but he adds a note, that deserves great attention: "Si vero meam plantam ab Hermanno ipso in Zeylona quondam collectam, et ad Breynium etiam ab ipso transmissam, examinem, et cum H. Malab. figura et descriptione conferam, in quibusdam differre videtur. Nostræ enim folia sunt multo longiora, angustiora, acutiora; frequentiora etiam multo ad surculos proveniunt, interpositis plurimis minoribus foliolis, quæ accuratissime omnia in tabula nostra (57.) insculpi curavi. Flores Schetti H. Malab. dicuntur incarnati, posteaque dilutiores, flavescentes, cum nostræ plantæ sunt intentissime holoserici, rubri." Now this difference between the *Schetti* and the plant of Burman, Hermann, and Breynius has not been sufficiently attended to by botanists, although I have little doubt that the plants of Rheede and Burman are specifically different. While thus we join the synonyma of Hermann and Breynius to the plant of Burman, we may leave those of Commeline and Plukenet to the plant of Rheede; only it must be remarked, that Burman quotes five different names from Hermann, three from the *Museum Zeylanicum*, one from his *Paradisi Batavi Prodromus*, and one from his *Herbarium*. Whether or not, under these different names, Hermann meant to denote

denote the same plant, I cannot say, not having it in my power to consult his works; but the plant contained in his *Herbarium* is no doubt the one which Burman described. But of this more afterwards.

It is further to be remarked, that Linnæus in his *Flora Zeylanica* (*p.* 54.) quotes the *Prodromus* of Hermann alone as describing the same plant with the *Schetti*, and omits the other names given by that author, considering them as not applicable; but he adds the *Ratabala* (Red Bala) as the Ceylonese name, which no doubt belongs to the plant of Burman, although it probably may be applicable to any *Ixora* with a red flower; for *Rata*, corrupted from *Rukta* of the Sanscrit, implies this colour. At any rate, Linnæus under the denomination of *Ixora foliis ovalibus semiamplexicaulibus* comprehended at least two plants, the *Schetti* of Rheede and the *Jasminum flore tetrapetalo* of Burman.

Burman the elder, when he published his *Thesaurus Zeylanicus*, had quoted for his *Jasminum flore tetrapetalo* the *Flamma sylvarum peregrina* of the *Herbarium Amboinense* (iv. 107, *t.* 47.); but when he came to publish this work, he perceived that this quotation could not be sustained, and therefore transferred his *Jasminum flore tetrapetalo* to the *Flamma sylvarum* of Rumphius (*Herb. Amb.* iv. 105. *t.* 46.), a quite different species from the *Flamma sylvarum peregrina*, and still more different from the *Schetti*.

The younger Burman (*Fl. Ind.* 34.), imitating the *Species Plantarum* of Linnæus, bestowed on the *Ixora* of the *Flora Zeylanica* the name *Ixora coccinea*, to which he annexed the synonyma of his father and Plukenet, together with the *Flamma sylvarum*, and the *Schetti*, thus including certainly two species. He indeed omitted all the synonyma of Hermann and Ray quoted by his father; but he added a new plant from Plukenet (*Mant.*

20. *t.* 364. *f.* 2.), the *Arbor Indica Lauri amplioribus foliis obtusis e regione binis, floribus Jasmini, summo ramulo umbellatim positis, ex Insula Johanna.* Now, although Plukenet compares this to the *Tsjovanni Amelpodi* (*Hort. Mal.* vi. *t.* 47.), a plant having five stamina, yet there can be no doubt of its being an *Ixora* very nearly allied to the *Flamma sylvarum peregrina*, but sufficiently distinct from the *Schetti*, the *Flamma sylvarum*, and the *Jasminum flore tetrapetalo;* so that botanists had now four species of *Ixora* with red flowers, all confounded under one name.

Willdenow left matters as they stood in Burman's *Flora Indica:* but M. Lamarck (*Enc. Meth.* iii. 343.), leaving out the plants of the elder Burman, Hermann, and Rumphius, joins to the *Schetti* the two synonyma of Ray, and the two of Plukenet. Not having the work of Ray, I cannot speak to that point; but M. Lamarck thus removed two plants confounded with the *Schetti*, and as the *Flamma sylvarum peregrina* is different from the *Jasminum flore tetrapetalo*, he in fact freed us from three interlopers. Still however he retained the *Arbor Indica ex Insula Johanna* of Plukenet, which I think certainly different from the *Jasminum indicum &c.* of that author; and this last has undoubtedly the best claim to be considered as the same with the *Schetti*, although, as I have said, there is great room to suppose that the plants of Burman and Rheede are different.

In the *Hortus Kewensis* (i. 244.) none of our Indian botanists are quoted for the *Ixora coccinea*, owing probably to the difficulty which occurred in reconciling the discordant synonyma; for it is not easy to say, even setting the *Species Plantarum* entirely aside, whether in the *Flora Zeylanica* Linnæus really meant the plant of Burman and Hermann, or the *Schetti*. The former is most probably the case, as it was the collection of Hermann which he described in the *Flora Zeylanica*.

Finally, in the *Flora Indica* (i. 385.) Dr. Roxburgh describes four

four species of Asiatic *Ixora* with red flowers. For the first, which he calls *I. coccinea*, he quotes first the *Schetti*, stating that the figure is pretty good, but that the description does not well agree; and secondly he quotes the *Jasminum flore tetrapetalo* of Burman, the figure of which is good. This is to say that Dr. Roxburgh's *I. coccinea* is that of Burman, but probably not the plant of Rheede. In this I entirely agree with my late friend. I have never seen this species except in the botanical garden at Calcutta; but the second species with a red flower, which Dr. Roxburgh called *I. Bandhuca* (*Fl. Ind.* i. 386.), is common every where almost that I have been in India, and seems to me to approach the nearest to the *Schetti*, although in the figure the divisions of the corolla are represented much too acute.

The other two species of *Ixora* with red flowers described in the *Flora Indica* are the *Flamma sylvarum*, and *Flamma sylvarum peregrina*, which Dr. Roxburgh called *Ixora fulgens* and *I. stricta*; but these names cannot be received, as the plants were previously named by the most respectable botanists. These four species however were all included among the synonyma quoted by Linnæus, or in authors referred to by him, for the *Ixora coccinea*, and it is by no means clear that the *Schetti* is any one of the four. If we thus admit five species, we shall have one for each of the five denominations, under which Hermann is supposed by Burman to have mentioned the *Ixora coccinea*, besides the African tree of Plukenet.

Bem Schetti, *p.* 19. *fig.* 14.

This plant is involved in almost as great difficulty as the preceding. Commeline in 1679 was unable to refer it to any preceding author; but in 1696 Plukenet called it *Jasminum indicum Lauri folio inodorum umbellatum floribus albicantibus* (*Alm.* 196. *Phyt. t.* 109. *f.* 2.), and found that it had been mentioned by

by Hermann, and through him by Breynius. I cannot however say, that I am satisfied with the plant of Plukenet being the same with that of Rheede; for the leaves are represented as "obovata obtusa" by Plukenet, and as "elliptica acuta" by Rheede; while in the former the stigma scarcely projects from the tube of the corolla, and in the latter is almost as long as the limbus.

Burman however in 1737 (*Thes. Zeyl.* 126.) called it *Jasminum flore tetrapetalo flavo;* and along with the *Bem Schetti* quoted Plukenet and his two synonyma, adding moreover the *Flamma sylvarum* of Rumphius, whose work was then in MS., and also a W. India plant from Sloane, which was certainly quite different. He had thus perhaps four plants included under the same name.

In 1747, Linnæus (*Fl. Zeyl.* 55.) under the name of *Ixora foliis ovato-lanceolatis* took up the *Bem Schetti* with the synonyma of Burman, only he rejected those of Rumphius and Sloane, thus freeing himself of two interlopers. Still however, whether the plant of Hermann, which Linnæus described, was the *Bem Schetti* or that of Plukenet, remains doubtful. I am inclined to think that the latter is the case, because he says *admodum affinis præcedenti* (i. e. *Jasmino flore tetrapetalo Burm. Thes. Zeyl.* 125. *t.* 57.) *et forte sola varietas.* Now the figure of Plukenet is not very unlike Burman's 57th plate, which has very little resemblance to that of the *Bem Schetti* in the *Hortus Malabaricus.*

In 1750, when Burman published the work of Rumphius, he had become sensible of his error in quoting the *Flamma sylvarum* for the *Bem Schetti,* and referred it to the *Schetti* with perhaps less accuracy, for the figures of the *Bem Schetti* and *Flamma sylvarum* are very much alike, much more so indeed than either the figure of the *Schetti,* or that of Burman's *Jasminum flore tetrapetalo;* but the bright red flowers of the *Flamma sylvarum* seem

seem to have been the circumstance that produced this change in the synonyma.

In 1768, the younger Burman, copying Linnæus, calls our plant *Ixora alba* (*Fl. Ind.* 34.), not a very proper name had the *Bem Schetti* been meant; for, although *Bem* implies white or pale, the flowers of the *Bem Schetti* are only "albicantes et subflavi, pede autem quo calyci insidunt (corollæ tubo) nonnihil quoque rubescente." At this time no change was made in the synonyma; nor did Willdenow make any material alteration, as he quoted both the *Bem Schetti* and Plukenet, although he omitted Burman and Hermann, and even the *Flora Zeylanica* of Linnæus, which he did probably because he considered Rheede as the best authority, and his figure has certainly very little resemblance to the *Ixora coccinea*, especially as represented by Burman (*Thes. Zeyl. t.* 57.).

In 1789, M. Lamarck (*Enc. Meth.* iii. 343.), justly dissatisfied with both name and synonyma, under the appellation of *Ixora lanceolata* described the *Bem Schetti*, to which he rejoined the *Flamma sylvarum*, which at any rate has the strongest affinity to the plant of Rheede; although a strong doubt is thrown on their identity by the colour of its flowers (qui minii rubentis sunt coloris interne, vetustique sunt sanguinei coloris, ita ut in quovis florum corymbo bini diversi conspiciantur colores, ipsorumque suavirubentis sunt coloris. *Herb. Amb.* iv. 105.). We scarcely therefore can consider the *Flamma sylvarum* as decidedly the same with the *Bem Schetti*, and it is totally different from the *Jasminum flore tetrapetalo* of the elder Burman (*Thes. Zeyl.* 125. *t.* 57.), with which M. Lamarck joins it, thinking that the *Schetti* was the *Ixora coccinea*, and perceiving that the plant of Burman was different. The *Ixora lanceolata* therefore contains probably three plants; and, as M. Lamarck besides quotes, although with doubt, the *Ixora alba* of Linnæus, if this great botanist meant really

really the *Jasminum indicum &c.* of Plukenet (*Alm.* 196. *Phyt. t.* 109. *f.* 2.), then M. Lamarck's *I. lanceolata* may contain four different species. As I have however said, he quotes Linnæus with doubt, and the plant of Plukenet he considers as at least a remarkable variety, if it be not altogether distinct. The only question therefore to determine is, whether M. Lamarck actually meant the *Bem Schetti* or the *Flamma sylvarum*, if these be really different, as there is reason to suppose, and this is not easily done: for, although M. Lamarck had specimens of his *Ixora lanceolata*, he evidently mixes in the description of the colours the two accounts of Rheede and Rumphius, the colours in his specimen having probably faded. My good friend Dr. Wallich indeed, in a note on the *Ixora fulgens* of Roxburgh's *Flora Indica* (i. 387.), thinks that M. Lamarck meant the *Flamma sylvarum*, and that therefore the *I. fulgens*, which is the *Ixora longifolia* of Sir J. E. Smith, is the same with the *Ixora lanceolata* of Lamarck, excluding all the synonyma except the *Flamma sylvarum*. This however seems to me very doubtful; and I think it probable, that M. Lamarck really saw the *Bem Schetti*, which he places first in his list of synonyma. As therefore the *Flamma sylvarum* should in propriety be called the *Ixora longifolia*, (Sir J. E. Smith having published before Dr. Roxburgh,) the *Bem Schetti* should be called *I. lanceolata;* for the *Ixora alba* of Linnæus is probably the plant of Plukenet (*Phyt. t*, 109. *f.* 2.). I know indeed that at one time this was Dr. Roxburgh's opinion, although in the *Flora Indica* he does not say so; but it was on this authority that he called the *Ta-mou-tang* of the Chinese the *Ixora alba* (*Fl. Ind.* i. 389.), which induces Dr. Wallich in the note to state, that it is widely different from the *Ixora alba* of Linnæus, meaning by this the *Bem Schetti*.

Notwithstanding what I have said respecting the difference of colour between the *Bem Schetti* and *Flamma sylvarum*, I have still

some

some hesitation in rejecting altogether the opinion of M. Lamarck concerning the identity of these plants; for the opinion of so accurate a botanist concerning a plant he had seen, and compared with both accounts, deserves the utmost consideration. Should it be well founded, the names *I. fulgens* and *I. longifolia* ought to be abandoned; unless indeed it should appear that Sir J. E. Smith had seen a plant different from the *Bem Schetti*, whatever may be the case with the *Flamma sylvarum*, as no one's accuracy requires greater attention.

NEDUM SCHETTI, *p.* 21. *fig.* 15.

The two last plants called *Schetti* evidently belong to the same genus, since called *Ixora* by Linnæus: but this has no affinity to them, being evidently a *Memycelon*; and it resembles strongly the *Memycelon cordatum* of M. Lamarck (*Enc. Meth.* iv. 89.; *Ill. Gen. t.* 284. *f.* 2.), only the leaves are much longer, and the *pedunculus communis* shorter than is represented in the figure of the French botanist. I have not been able to discover that this plant has been quoted by any subsequent author.

SCHERUNAM COTTAM, *p.* 23. *fig.* 16.

Plukenet in his *Mantissa* (21.) compares this to his *Arbor indica mali aurantii foliis obtusioribus e Maderaspatan* (*Phyt. t.* 142. *f.* 2.), which in the *Almagestum* (43.) he had compared to the *Akara Patsjoti* (*Hort. Mal.* v. *p.* 15.), which is the *Tetracera malabarica*, and seems to have very little resemblance indeed to Plukenet's figure. This, however, may represent the *Scherunam Cottam*, although both the drawing and description are so imperfect, that nothing decisive on this point can be stated. Plukenet quotes as synonymous, from the Commentator on the *Hortus Malabaricus*, the *Corni sive Sorbi species* of Bontius.

Linnæus in the *Flora Zeylanica* (367.), joining the *Scherunam Cottam* with a plant of Ray, with one of Hermann mentioned also by Burman (*Thes. Zeyl.* 29.), and withthe plant of Bontius quoted by Plukenet, without however mentioning the latter, calls it *Clutia foliis ovalibus petiolatis retusis, floribus racemosis sessilibus.* Now the plant of Rheede has four seeds in a subacid berry, which seems also to be the case with that of Ray (*fructu tetraspermo*); while the plant of Linnæus, if it be a *Clutia*, has a capsule with three cells. Linnæus indeed acknowledges that the figure in the *Hort. Mal.* represents his plant badly; so that even he was not satisfied with his quotation, probably on account of the description of the fruit by Rheede. To the *Scherunam Cottam* probably, therefore, we may leave the synonyma of Ray and Bontius; while Hermann, and also Burman, who does not quote the *Hort. Mal.*, probably described the *Clutia* of Linnæus.

The younger Burman (*Fl. Ind.* 217.) makes no change on the synonyma; but follows the *Species Plantarum* in calling the plant of the *Flora Zeylanica*, *Clutia retusa*, and quotes the *Hortus Malabaricus* without doubt.

M. Lamarck however (*Enc. Meth.* ii. 54.) received plants from M. Sonnerat, and had seen others in the collection of Commerson, which he considered as well represented by the figure of Rheede; and he quotes also the synonyma of Ray and Bontius; but doubts of his plant, which he calls *Clutia squamosa*, being the *Clutia retusa* of Linnæus. At any rate, this *Clutia* certainly is not the *Scherunam Cottam*, as it produces "capsules ovoïdes, globuleuses, lisses, a trois ou quatre loges monospermes;" while the fruit of the *Scherunam Cottam*, as Linnæus justly observed, is a berry: "Fructus qui surculis insident parvi et rotundi sunt ad instar pirorum lauri superficie glabri, primum virides ac nitentes, dein colore nigro dum maturi sunt et saporis subacidi, continentque quatuor grana seminis alba ac transparentia

parentia in propriis suis loculis." Whether or not the *C. squamosa* is the same with the *C. retusa* I cannot say; M. Lamarck himself doubts it.

When the *Flora Coromandeliana* of Dr. Roxburgh was published, it was judged proper, on account of the near resemblance in sound between *Clutia* and *Clusia*, to change the former into *Cluytia*, thus assimilating the word more to the name of the botanist after which the genus was called. This change was adopted by Willdenow, who, without noticing the *Clutia squamosa*, gives us the *Clutia retusa* with the synonyma as in the *Flora Zeylanica*, and quoting the *Hort. Mal.* as giving a bad figure of his plant.

After all, the figure of the *Scherunam Cottam* given by Rheede is so very like the *Briedelia spinosa* (*Willd. Sp. Pl.* iv. 979.), and scarcely, if at all, different from the *Cluytia stipularis* (*Willd. Sp. Pl.* iv. 883.), that I should have no doubt of considering them the same, were it not for the description of the fruit in the text, which cannot be reconciled with the idea of its being either a *Cluytia* or a *Briedelia*.

Schem Pariti, *p.* 25. *fig.* 17.

There can be no doubt of this being the *Hibiscus Rosa sinensis* of all botanists since the time of Linnæus. Why he gave it that name is not very evident; for the plant known by old botanists as the *Rosa sinensis* is what Linnæus calls *Hibiscus mutabilis*. Probably he was misled by a careless inspection of the note by Commeline, respecting the *Schem Pariti*, who says, "Procul dubio planta hæc est species *Rosæ sinensis* Ferrarii:" but this does not imply more than that it is a species of the same genus. In the *Flora Zeylanica* (260.) indeed Linnæus quoted as synonymous the *Althea arborea, Rosa sinensis, flore multiplici* of Hermann, and considered the application of the term *Rosa sinensis* to

the *Hibiscus mutabilis* as a vulgar error This quotation from Hermann is however probably erroneous, and owing to a mistake in the elder Burman (*Thes. Zeyl.* 133.), who joins the *Rosa sinensis* of Ferrarius and its synonyma with the *Schem Pariti* of Rheede, and the *Flos festalis* of Rumphius, and the *Wadda ghas* of the Ceylonese, which are the *Hibiscus Rosa sinensis* of Linnæus, by Hermann called *Malva indica, frutescens, flore pleno, roseo, rubro:* but this Linnæus did not quote; because, in order to obtain the name *Rosa sinensis*, he had quoted another plant of the same author.

Burman, in treating of the same plant, seems to have led Linnæus into another error, by quoting the *Ketmia sinensis fructu subrotundo, flore pleno* of Tournefort, as being the same with the *Schem Pariti*; while it no doubt belongs to the *Hibiscus mutabilis* of Linnæus, as M. Lamarck (*Enc. Meth.* iii. 353.) justly observes.

It is further to be remarked, that Linnæus quotes only the authors who treat of this plant in its unnatural state of bearing double flowers, which is the case with the *Schem Pariti:* but Rheede (*Hort Mal.* vi. 73. *t.* 43.) describes the single-flowered plant under the name of *Ain Pariti.* This was quoted by Burman, which renders the omission by Linnæus the more remarkable: nor did even Lamarck remedy this defect.

Willdenow (*Sp. Pl.* iii. 812.) has abandoned the error respecting Hermann, but retains that respecting Tournefort; and from the carelessness of his printer has introduced *Scheru Pariti* in place of *Schem Pariti.*

BELILLA, *p.* 27. *fig.* 18.

The commentator was unable to compare this with any plant known to him; and Plukenet did not advance further. It is true, that in the *Mantissa* (49.) he was inclined to compare it with

with his *Cistus sempervirens Laurifolia, floribus eleganter bullatis Virginiana* (*Alm.* 106.; *Phyt. t.* 161. *f.* 3.); that is, with the *Kalmia angustifolia:* but he acknowledges that the plants are different; indeed they have no sort of affinity.

Rumphius, under the name *Folium Principissæ*, described (*Herb. Amb.* iv. 111.) what he considered to be the same with the *Belilla:* but under this name he evidently described two very distinct species (*latifolium* and *angustifolium*) of the same genus; nor does he mention which he considered as the same with the *Belilla.* We may however observe, that he says, "*Latifoliæ* speciei folia quodammodo cum illis *Brassicæ* conveniunt, suntque ampla et subrotunda, in obtusum apicem desinentia,—lanuginosa, septem, octo et novem pollices longa, sex septemve lata.—Unus autem ex quinque radiis (laciniis) calycis excrescit in folium album odoratum instar unguenti cujusdam aromatici—in usu apud mulieres ad corpora sua lavanda, cum ipsis gratum concilient odorem." Again, he says of the other species: "*Angustifoliæ* speciei folia sunt minora angustiora firmiora nec adeo lanuginosa, et folium ex calyce album fere inodorum." It is to this evidently that the figure (*t.* 51.) refers; for its leaves are small and sharp-pointed, having no sort of resemblance to those of a *Brassica.* Now Rheede says, "Folia oblongo-rotunda (ovata) cum cuspide angusto in vertice (acuminata), pilosa, ac lanuginosa—Folium albissimum, quod loco quinti calycis folii cuspidati fructus vertici insidet, odoris sylvestris." Now from what is above stated, the *Folium Principissæ angustifolium* has by far the greatest resemblance to the *Belilla*; but then the flowers of the latter "interius colorem habent rubicundo pulchrum, seu scarlatinum;" while those of the *Folium Principissæ* are "interne maxime lutei." It is true, that this is said expressly of the *F. P. latifolium* only; but it is said, "angustifolii flores latifolii sunt similes;" and a plant, which I think the *F. P. angustifolium*, has accordingly

cordingly yellow flowers; nor have I seen one which had scarlet flowers as described by Rheede.

Burman the elder, when he published the *Thesaurus Zeylanicus* (165.), united the *Belilla* with his *Mussænda Zeylanica, flore rubro, fructu oblongo polyspermo, folio ex florum thyrso prodeunte albo:* but although the flowers of this, like those of Rheede, are red, the white leaf of the corymbus does not proceed from an enlarged division of the calyx, but is one of the bracteæ. This, therefore, must be a different species from the *Belilla* of Rheede, as well as from both those of Rumphius, with which Burman unites it. It would also seem to be different from the plant of Ray, which Burman also quotes, and which is described as "*Mussænda*, arbor Indica, floribus in summis ramulis veluti in fasciculos dispositis, e quorum medio surgit folium latum, singulare, flavicans." Now the yellow colour distinguishes this plant of Ray from all the species of *Mussænda* yet mentioned; and that it was not an accidental tinge communicated to a dried specimen seen by Ray, as might have been supposed, we may infer from the account given of the *Mussænda* of Hermann (quoted also by Burman), who described from the living plant: "Folium, quod ex florum thyrso prodit, differt a cæteris, estque coloris luteo-virescentis." Burman indeed elsewhere (*p.* 166.) says of these bracteæ; "color in his albus, vel flavescens:" so that if they are liable to this variation, the plant of Ray and Hermann may be the same with that of Burman: but I suspect that he merely says this to reconcile Ray's account with his own; a manner of obviating difficulties not I believe uncommon with more accurate botanists than he was.

Burman seems indeed to have often quoted, as synonymous, plants which he only considered as belonging to the same genus with what he was describing: for although he quotes the *Belilla*, he is at pains to point out essential differences between it and his plant:

plant: "Notandum est quod in *Hort. Malab.* calyx brevis et quinquedentatus tantum exhibeatur, quum in nostra planta sit tenuis—in quinque radios longitudine floris productus, longus, hirsutus." He also supposes that Rheede represented the *Belilla* as smooth; but does not lay much stress on this circumstance, because, as he justly observes, the pubescence of plants is often omitted in the figures of the *Hort. Malabaricus*. That however does not seem to me to be the case in the figure of the *Belilla*, the leaves of which at least are represented as hispid. The other parts, indeed, which in Burman's figure (*t.* 76.) are represented hirsute, appear smooth in the *H. Malabaricus*, probably from the carelessness of the draughtsman, as Burman observes. Burman justly distinguishes his plant from the *Folium Principissæ* of Rumphius. This indeed he does upon bad grounds; because, judging merely from the figure (liable to the same error with the *Hort. Malab.*), he supposes the plant of Rumphius to be smooth; but in the description already quoted Rumphius expressly calls the leaves hairy (*pilosa*). When however Burman published the *Herbarium Amboinense*, he retracted this distinction, and adhered to all the synonyma except the *Belilla*, which he does not mention; nor does he notice any difference between the *F. Principissæ latifolium* and *angustifolium*.

Linnæus in the *Flora Zeylanica* (84.) describes the *Mussænda* of Hermann, which should therefore have yellow bracts; and accordingly he adds as synonymous the plant of Ray with bracts of this colour: but, like Burman, he also quotes Ray for his *Frutex indicus baccifer, fructu oblongo polyspermo*, which may be different from the *Mussænda arbor Indica*, and the same with the *Mussænda Zeylanica* of Burman, which is also quoted; as is even the *Belilla*, which Burman seems to have abandoned. It is impossible, therefore, from the synonyma alone to say which plant Linnæus meant.

When

When the younger Burman published the *Flora Indica* (53.) matters had not improved. He quotes for his *Mussænda frondosa* the *Flora Zeylanica*, his father's *Thesaurus*, the *Folium Principissæ* without distinguishihg the two species, and the *Belilla*. He indeed omits both plants of Ray; but he quotes the plant with yellow bracts described by D. Pryon in words nearly the same with those used by our great English botanist.

In Willdenow (*Sp. Pl.* i. 997.) the synonyma for the *Belilla* or *Mussænda frondosa* undergo no change for the better. He adds indeed a quotation from Vahl, and restores both the synonyma of Ray, omitting the name of D. Pryon: but from these changes nothing enables us to say which plant he meant. This passage, however, from the note annexed (Bractea altera cujusvis pedicelli enata in folium album) may enable us to infer, that his specimen belonged to the species described and figured by the elder Burman.

M. Lamarck, however in general accurate, having totally mistaken the character of the *Gardenia*, in supposing it to have a berry divided into two or four cells, naturally enough reduced the *Mussænda frondosa* to that genus, calling it *Gardenia appendiculata*, with the synonyma as in Willdenow, Vahl excepted (*Enc. Meth.* ii. 608.); but it would appear that his specimens belonged to the plant of Rheede, as the leaves were sharp-pointed and hairy, the flowers red, and the white leafy appendix proceeded from the calyx. He indeed adds, that the flowers have "une odeur aromatique fort agréable;" while Rheede says, "suntque odoris nullius." As his specimens were communicated by M. Sonnerat, probably in a dry state, we may perhaps be allowed to suppose that this sweet smell is taken from the account given by Rumphius of the *Folium Principissæ latifolium*, which is certainly a species totally different from that given by M. Lamarck (*Ill. Gen. t.* 157. *f.* 1.), and marked *b.c.d*, which

which I think is the *Belilla*, or from the plant more fully delineated, and marked *a*, which is probably the *Folium Principissæ angustifolium*, the flowers of which are represented as smaller than those of the *Belilla*. When the work of M. Lamarck last quoted was published, he had become sensible that the *Mussændas* should be separated from the *Gardenias*; and in the 4th volume of the *Encyclopédie* (395.) the *Gardenia appendiculata* is by M. Poiret called *Mussænda frondosa*; but he refers to the synonyma of M. Lamarck without change, so that his plant is probably the *Belilla*.

In a note respecting the *Mussænda pubescens* in the *Hortus Kewensis* (i. 373.) it is stated, "calyce brevissimo differt a *M. frondosa*, cui calycis foliola linearia, tubo corollæ parum breviora:" which shows that the author followed Willdenow, copying probably from the *Mantissa* of Linnæus, in considering the plant of the *Thesaurus Zeylanica* as the proper *Mussænda frondosa*.

In the *Hortus Bengalensis* (15.) the *Belilla* is quoted for the *M. frondosa*: but in this I suspect some mistake; for the plant which I found growing in the garden, and the only *Mussænda* there with leafy appendages to the calyx, was the *Folium Principissæ angustifolium*, having small yellow flowers. This I call *Mussænda Dovinia*; while the *Belilla* should be called *M. Belilla*, the plant of Burman *M. frondosa*, and the plant of Ray and Hermann *M. flavescens*.

Modira Canni, *p.* 29. *fig.* 19.

Commeline in his annexed note supposes this to be a species of the *Caniram* (*Hort. Mal.* i. 67. *t.* 37.), that is, of the genus now called *Strychnos*; and Plukenet thought that it might be the same with his *Solanum arborescens e Veracruce latifolium* (*Alm.* 350.), neither of which opinions is in the least tenable on account of the ten stamina and five styli. Hermann, Ray, and the elder Burman

Burman did not improve matters by calling it a *Cerasus* (*Thes. Zeyl.* 57.); for, although Burman does not quote the *Modera Canni*, they probably meant the same plant, as Linnæus supposed (*Fl. Zeyl.* 249.). It must be observed, however, that the specimens of Hermann, which Linnæus examined, had only three styli, whereas Rheede evidently describes five; and his figure represents the sexual parts as entirely hid by the corolla, while Linnæus represents the united filaments as being as long as that covering.

The younger Burman, adopting the Linnæan name *Hugonia Mystax*, adds from the Herbarium of Petiver, *Nux vomica maderaspatana minima, spinis corniculatis;* which shows that Petiver fell into the same mistake with Commeline. What is of more importance, Burman remarks a difference in the three specimens, which he had seen, that from Java differing from that of Ceylon, while both differed from the specimen of Petiver. He gives us, however, no means of judging which he considered as the *Modera Canni*.

It must be remarked, that Linnæus and the younger Burman quote Ray, as describing the plant under two names, and M. Lamarck (*Enc. Meth.* iii. 149.) does the same; yet no two of these authors agree concerning the names given by Ray to this plant. In the elder Burman, who quotes only one name of Ray, and in one of Ray's names quoted by M. Lamarck, he is made to compare the *Modera Canni* with the *Cerasus;* but in the younger Burman he distinguishes it by two distinct generic names, *Ægoceratos* and *Mystax*, both of which by Linnæus are thrown into the back ground, and the latter by M. Lamarck is entirely left out. It must further be remarked, that although M. Lamarck justly distinguishes the *Hugonia Mystax* of Linnæus, or *Modera Canni*, from the *H. Mystax* of Cavanilles, which the French botanist therefore calls *H. serrata;* yet in the

Supplement

Supplement to the *Encyclopédie* (iii. 62.) we are referred for a figure of the *H. Mystax* to the *Illustr. Gen.* of Lamarck (*t.* 572.), where the leaves are represented serrated; yet this figure cannot represent the *H. serrata* of Lamarck or *H. Mystax* of Cavanilles, as it is a real *Hugonia* with a drupa containing ten seeds (*Gærtn. de Sem.* i. 281.), while the fruit of the *H. serrata* is a berry with five cells, each consisting of two valves containing one seed; for I presume that it is from the description of this plant by Cavanilles that M. Lamarck took his character of the genus *Hugonia*.

Willdenow made no change on the synonyma, copying from the younger Burman the typographical error of *Modira* for *Modera;* and he quotes Ray in the same manner, which is probably therefore right. He adds in a note, "Possideo varietatem e Zeylona foliis obovatis majoribus, ramis flavescentibus inermibus." Now it so happens, that the only *Hugonia* which I have seen, would appear to be what Willdenow calls a variety of the *Hugonia Mystax* (*Sp. Pl.* iii. 694.); but I doubt very much of its being the same with the *Modera Canni*. I found it in the south of India, below the Ghat mountains, in 1801, and a drawing and specimen were given to Sir J. E. Smith in 1806. I call it

Hugonia obovata inermis erecta, foliis obovatis integerrimis glabris, petalis oblique retusis.

Habitat in sylvis Cheræ et Dravedæ asperis.

Arbuscula non sarmentosa. *Rami* inermes, teretes, rudimentis petiolorum exasperati. *Ramuli* pilosi. *Folia* sparsa, apices versus ramulorum conferta, oblongo-obovata, integerrima, obtusa, nitida, venosa, plana. *Petiolus* brevissimus, pilosus. *Stipulæ* geminæ, laterales, marcescentes, subulatæ, erectæ, integerrimæ, mediocres. *Pedunculus* axillaris, solitarius, patens,

patens, petiolo triplo longior, uniflorus, incrassatus, tomentosus. *Bracteæ* ad pedunculi partem imam geminæ, deciduæ, subpalmatæ, stipulas longitudine æquantes. *Flores* flavi, folio latiores, erecti. *Calycis* foliola quinque ovata, concava, acuta, quorum duo exteriora majora, tomentosa. *Petala* quinque calyce duplo longiora, obovata, oblique retusa, unguibus incrassatis mucronata. *Filamenta* decem alternis longioribus subulata, basi in urceolum hypogynum sessilem coalita. *Antheræ* orbiculatæ, compressæ. *Germen* superum, subrotundum. *Styli* quatuor vel quinque, subulati, staminibus paulo longiores. *Stigmata* reniformia. *Germen* paulo auctum loculos habet quatuor vel quinque.

From the last-mentioned circumstance we may probably conjecture, that this is not only a different species from the *Modera Canni;* but, like the *H. serrata,* can scarcely be considered as belonging to the same genus, the fruit is so different.

CARIM CURINI, *p.* 31. *fig.* 20.

In his *Phytographia* (*t.* 171. *f.* 4.) Plukenet gave the figure of a plant, which he calls *Curini forte, prima species, seu Carim Curini Hort. Malab.*, which implies that he doubted of his plant being the same with that of Rheede: and he seems to have suspected that it might rather be the *Manja Curini* (*Hort. Mal.* ix. *t.* 62.): but for this I see no reason; and the elder Burman (*Thes. Zeyl.*) joins Plukenet's plant, without doubt, to the *Carim Curini,* as do most subsequent authors. Burman's figure indeed (*t.* 4. *f.* 1.) is not so good as that of Plukenet: but he describes a plant with a white flower, while those of the *Carim Curini* are blue. This difference alone is however too slight to be reckoned a foundation for two species; yet Burman was justified in calling them varieties, in which however he is not followed by succeeding

succeeding authors; although the figures would seem to indicate still greater differences, especially in the lower bracteæ being deciduous in Burman's plant, and persistent in the *Carim Curini*. The synonyma of Hermann and Plukenet, mentioned in Burman, belong to the *Carim Curini*.

Linnæus in treating of this plant (*Fl. Zeyl.* 17.) omits the synonyma of Tournefort and Bobart, and adds one from Ray, without noticing the difference between the plants of Burman and Rheede. The younger Burman again, having adopted the name *Justicia Ecbolium* from the *Species Plantarum*, restores the name of Tournefort, omits that of Ray, and adds one from the Herbarium of Garcin. The plant which he had seen was that described by his father.

M. Lamarck (*Enc. Meth.* i. 626.) quotes again Ray, but omits Garcin, and adds a plant of Forskael, which this botanist considered different from that of Linnæus, as he called it *Justicia viridis*. Besides this M. Lamarck adds two varieties, of which he had received specimens, one from India and the other from Madagascar; and both seem to differ considerably from the *Carim Curini*.

Willdenow (*Sp. Pl.* i. 85.), omitting all the older authorities, except the elder Burman, Plukenet, and Rheede, quotes several descriptions from recent authors; but mentions nothing to enable us to judge, whether either he or they meant the plant of Burman or that of Rheede, if he really saw either; for the plant of Forskael, which he evidently describes, is distinguished "*galea corollæ bidentata*," while in the figures of Burman, as well as in those of Plukenet and Rheede, this member is represented as undivided. The differences, which I have mentioned as belonging to the synonyma conjoined with the *Carim Curini*, are of too little importance to require a subdivision into several species, unless accompanied by others more remarkable, which may

may very possibly be the case: but the determination of this I must leave to other observers. Dr. Roxburgh (*Fl. Ind.* i. 115.), although he quotes the *Carim Curini* alone, describes the upper lip of the corolla like Forskael; but this is not the case in the *Hortus Kewensis* (i. 36.), nor in either of the specific characters of Vahl, for two are quoted by Willdenow.

Bem Curini, *p.* 33. *fig.* 21.

This plant has entirely the habit of the preceding, and of the *Justicia Adhatoda* of Linnæus, which is much more than can be said of most of the plants usually referred to the same Linnæan genus, and even of those which constitute the Malabar genus *Curini*. It seems to have been first described by Bontius; but of this Commeline was not aware. Ray, Hermann and Tournefort mention the plant of Bontius about that time; yet the elder Burman (*Thes. Zeyl.* 47.) does not seem to have known that the plant of Hermann and Bontius was the *Bem Curini*. This was first pointed out by Linnæus (*Fl. Zeyl.* 18.), who quotes all the preceding authorities, and in the *Species Plantarum* called it *Justicia Betonica*, a name adopted by the younger Burman (*Fl. Ind.* 8.). Here another authority, Garcin, is quoted; but neither in the *Encyclopédie* nor in Willdenow is this retained, and the latter omits the authorities of Tournefort, Ray, and Hermann, introducing in their stead Vahl and Fabricius. Dr. Roxburgh (*Fl. Ind.* i. 129.) quotes the *Hort. Mal.* alone, which is also the case in the *Hortus Kewensis* (i. 41.), the one probably meaning for the synonyma to refer to Willdenow, and the other to Vahl.

Dr. Roxburgh had in the botanical garden at Calcutta a plant, which he considered different from the *Bem Curini*, and which he called *Justicia ramosissima*. He received both plants from Madras, while I found a plant growing by the sides of rivulets among

among the hills near Mungger, from which I cannot distinguish either the *J. Betonica* or *J. ramosissima* of Dr. Roxburgh by any mark on which I can place reliance. Specimens of all the three have been deposited in the collection of the East India Company. Although I have no doubt of the plant, which I found, being the *Bem Curini*, its antheræ are so different from the character of them given by Willdenow and in the *Encyclopédie*, where the loculi are described as united, that our plant is either different from theirs, or they have placed it very erroneously among the *Monantheræ*. I must indeed remark, that the identity of our plant, with that of Linnæus in the *Flora Zeylanica*, is by no means clear; because he describes the bracteæ oppositæ, but with us they are quaternæ. If this distinction be sufficient to separate the species, then the plant of Linnæus being the undoubted *Justicia Betonica*, we may adopt for ours Dr. Roxburgh's name *J. ramosissima*, transferring to it the *Bem Curini*, of which I shall now give a description from the plant in its wild state, those of Dr. Roxburgh having been cultivated.

Frutex duos pedes alta, diffusa. *Radix* lignosa, digitum crassa. *Rami* subpubescentes, sulco gemino utrinque inter folia decurrente angulati, internodiis basi incrassatis. *Folia* lanceolato-ovata, subrepanda, dentata, costata, venosa, utrinque pubescentia, scabriuscula; superiora acuta, inferiora obtusiuscula. *Petiolus* brevissimus, anceps, acutangulus, subtus convexior, annulo integerrimo ramum cingens.

Spicæ nunc ramulo brevissimo diphyllo axillari insidentes, tunc rami majoris apicem terminantes, intermedia aliquando iterum trifariam divisa, folio longiores, erectæ, subsecundæ, quadrifariam imbricatæ bracteis ovatis, acutis, persistentibus, albis, nervis viridibus reticulatis; quarum dorsales simplices,

simplices, steriles, ventrales triphyllæ, unifloræ foliolis subæqualibus, flore paulo longioribus. *Flores* mediocres, albi, labio inferiore ad basin rubro punctato. *Calyx* ultra medium quinquefidum laciniis acutis, lanceolatis, carinatis, æqualibus. *Corolla* ringens, pubescens, nervosa: *labium* superius erectum, ovatum, apice bifidum; inferius revolutum, ultra medium trifidum laciniis oblongis, obtusis, quarum intermedia latior, basi rugis coloratis bifariis picta. *Filamenta* duo longitudine fere floris, apice membranaceo dilatata. *Antherarum* loculi discreti, inferiore basi corniculato. *Capsula* ungue compresso longitudine calycis pedicellata, ovata, compressa pubescens, bivalvis, bilocularis, ad latera angustiora dehiscens, valvis medio septiferis. *Semina* solitaria, echinata, retinaculo subtensa.

CARETTI, *p.* 35. *fig.* 22.

Commeline in his *Commentary*, Plukenet (*Alm.* 4.), and the elder Burman (*Thes. Zeyl.* 4.), seem to have confounded with the *Caretti* the synonyma belonging to the plant called by Linnæus *Guilandina Bonduc*, although the last-mentioned author published after having had an opportunity of seeing the work of Rumphius, by whom the *Caretti* was called *Globuli majores* (*Herb. Amb.* v. 92.), while the *Bonduc* was called *Frutex globulorum* (*l. c.* 89.). Burman, however, even in his notes on Rumphius, published after the *Thesaurus Zeylanicus*, persists in referring the *Caretti* to the *Frutex globulorum*, adding the synonyma which belong to the *Bonduc*; while for both the *Frutex globulorum* and *Globuli majores* he quotes the same figure of Plukenet (*Phyt. t.* ii. *f.* 2.), which indeed is so imperfect, that it may be supposed to represent either, had not the synonyma which Plukenet quoted (*Alm.* 4.) pointed out that he meant the *Bonduc*. Burman, therefore, in all probability considered both plants

plants of Rumphius as belonging to the same species; and it must be confessed, that they have the utmost affinity.

Notwithstanding this affinity, Linnæus in the *Flora Zeylanica*, although he does not quote the *Herbarium Amboinense*, not only distinguished the plants, which Rumphius had called *Globuli majores* and the *Frutex globulorum*, as species, but he placed the former in the genus *Guilandina* (156.), and the latter in that called *Cæsalpinia* (157.); although it is by the fruit alone, that these genera can be distinguished, and Linnæus acknowledges that the fruit of this *Cæsalpinia* is that of a *Guilandina:* but concerning this genus his notions seem still later to have been very confused; as he included in it the *Moringa* of old botanists, which has no sort of affinity to either plant of Rumphius. Linnæus however separated the synonyma of the two plants, which had been confounded together by Commeline, Plukenet, and Burman, excluding several belonging to American plants, although as synonymous with the *Caretti* he still quoted an American plant described by Plumier.

In his first edition of the *Species Plantarum*, Linnæus corrected his error in placing the two plants of Rumphius in different genera, and reduced them both to *Guilandina*, in which he was imitated by the younger Burman (*Fl. Ind.* 99.). The *Caretti* thus became the *Guilandina Bonducella*. Burman, although he does not quote the plant of Plumier, restores that of Sloane, and adds besides to the synonyma mentioned in the *Flora Zeylanica* thè names given by Rumphius and Breynius, which no doubt belong to the *Caretti*.

M. Lamarck (*Enc. Meth.* i. 434.) made little change on the synonyma of the *G. Bonducella*, restoring only the name of Plumier; to which Willdenow added quotations from Brown's *Jamaica*, from Vahl, and from Forskael. How the latter could

call this plant a *Glycyrrhiza*, seems very remarkable, and I suspect some error in his being quoted.

In the *Hortus Kewensis* (iii. 32.) the author returns to the opinion of the elder Burman, and considers the *Bonducella* as the same with the *Bonduc*, quoting for his plant, which he calls *G. Bonduc*, the *Globuli majores* of Rumphius, and omitting the *Caretti*, which I consider the same on account of the lower leaflets resembling stipulæ, which is not the case in the *G. Bonduc* of Linnæus, that is, the *Frutex globulorum*, a plant which, it would seem, the author of the *Hortus Kewensis* had not seen, and which is indeed rare in India proper, if it be found there at all.

Dr. Roxburgh received the *G. Bonduc* from Sumatra, and returned to the first opinion of Linnæus, calling it a *Cæsalpinia;* but then he transferred along with it the *Bonducella* or *Caretti*, and I must confess, that, upon a full examination of a good many species, I can observe no other distinction between the leguminous *Guilandinas* and the *Cæsalpinias* than a prickly and smooth legumen; and even this distinction is rendered less striking from the fruit of the *Cæsalpinia Mimosoides*, which is not indeed prickly, but is covered with hairy tubercles, so that it cannot be called smooth: but to this I shall have occasion to return, when I treat of the *Kal Todda Vadi.* If all the leguminous *Guilandinas* were with Dr. Roxburgh joined with the *Cæsalpinias*, the name *Guilandina* could with propriety be reserved for the species with capsules, and we might thus be rid of the modern Greek *Hyperanthera*, which, if it has any meaning, implies *nimis floridus*, a term by no means applicable to the genus. Even admitting the botanical *anthera* to be convertible into the Greek *ανθηρος*, *Hyperanthera* would imply *occupying the higher part of the anthera* as *ὑπερωιχος* implies *occupying the higher part*

part of the house; but this meaning of *Hyperanthera* also applies to nothing remarkable in the genus.

CUPI, *p.* 37. *fig.* 23.

Commeline does not compare this to any plant known before; and the plants with which Plukenet compares it (*Alm.* 125. *Amalth.* 69.) seem to have no great resemblance, at any rate they are not the same. Linnæus therefore (*Flora Zeylanica* 80.) justly rejected them, when he referred this plant to the genus *Rondeletia*, which had been established by Plumier; although he admits that there are differences in the characters of the plants. He quotes Ray and Commeline as having described his *Rondeletia;* but it is likely, that they took their account from the *Hortus Malabaricus;* and, as they call it merely *Frutex indicus baccifer*, it is evident that they knew little of its affinities.

When Linnæus published the *Species Plantarum*, he called this plant *Rondeletia asiatica*, a name adopted by the younger Burman, who made no change on the synonyma. The fruit of the *Rondeletia* is a capsule; but that of the *Cupi* is a berry. "Fructus sunt maturi nigricantes saporis subdulcis et in eduliis." Willdenow (*Sp. Pl.* i. 1224.) was therefore perfectly justifiable in removing it from the genus *Rondeletia;* but in his arrangement he errs much further than Linnæus; for he places it among the *Contortæ* in place of the *Rubiaceæ;* and still further he joins it in the same genus with the *Tsjeru Kara*, which is a *Canthium*, and has only one seed in each cell of the fruit. Willdenow indeed makes this a distinguishing character of the genus *Webera*; but Rheede says, "In hisce fructibus sunt septem, octove plus minus semina, quæ in medio intersepimento, quod fructum in longum secat, in duos ordines sunt distincta." M. Poiret was therefore much in the right (*Enc. Meth.* vi. 256.) to leave the *Cupi* rather where it had been placed by Linnæus,

than to join it thus with the *Canthium*. If however Willdenow had rejected from his genus *Webera* the *Tsjeru Kara*, and the generic character which he had chosen, the *Cupi* would have afforded a well defined character for distinguishing a new genus of plants, as has been done by Gærtner (*De Sem.* iii. 71. *t.* 192. *f.* 5.), by whom the *Cupi* is called *Webera corymbosa*.

CATTU SCHIRAGAM, *p.* 39. *fig.* 24.

Commeline has not given us any opinion concerning this plant. Plukenet proposes with doubt, whether it is the same with his *Eupatoria Conyzoides, integro Jacobeæ folio, molli, et incano Indiæ orientalis* (*Alm.* 140. *Phyt. t.* 177. *f.* 1.); but the elder Burman (*Thes. Zeyl.* 123.) justly rejects this opinion. The plant of Plukenet, with Breynius, he calls *Jaceæ et Serratulæ adfinis, capitulis Bacharidis, foliis Tracheliæ, Zeylanica;* while the plant of Rheede he calls *Scabiosa conyzoides, foliis latis, dentatis, semine amaro, lumbricos enecante* (*Thes. Zeyl.* 210.); and he gives a good figure (*t.* 95.) for the express purpose of enabling the reader to compare it with the figure of Plukenet, so as at once to perceive the difference (*p.* 113.). Strange however to say, along with the synonyma properly belonging to this *Scabiosa*, he joins (*p.* 210.) not only the *Jaceæ et Serratulæ adfinis* of Breynius, but the very plant of Plukenet, which he has said was different. No reliance can therefore be placed on the synonyma, which he quoted for either plant, and the more especially as he quotes three other figures of Plukenet (*Phyt. t.* 87. *f.* 2. *t.* 154. *f.* 4. and *t.* 159. *f.* 4.), the last of which is the *Spilanthes Pseudo Æmella* of Willdenow.

Linnæus in the *Flora Zeylanica* (*p.* 418.), not being satisfied to what genus the *Scabiosa* of Burman should be referred, called it *Bacharioides;* but he did not quote the *Cattu Schiragam*. Doubting the accuracy of Burman, but unwilling to offend him, he

proposes as a query, whether the *Jaceæ vel Serratulæ adfinis* of this author can be the same; and, neglecting most of the synonyma referred to by his friend, he only quotes the *Scabiosa indica, capitulis foliaceis, major, foliis Trachelii* of Hermann, whose plant indeed it was that he saw, together with the plant figured by Plukenet in the 154th plate of the *Phytographia*, acknowledging that the figure is bad, that is to say, not like his specimen. He adds to these synonyma the *Serratula indica major capitulo folioso* of Morison; but thinks, that the plant has a greater resemblance to the *Conyza major vulgaris C. B. P.* than to the *Serratula*. It must be observed, that he describes the "Semina pilis simplicibus longitudine calycis coronata."

This general resemblance to the *Conyza* induced Linnæus, on publishing the *Species Plantarum*, to call this plant *Conyza anthelmintica*, in which as usual he was followed by the younger Burman (*Fl. Ind.* 178.), although the generic character of *Conyza* is totally wanting in the *Bacchariodes*. Burman added to the synonyma the *Cattu Schiragam*, and a name given by Vaillant, who, like Linnæus, considered the plant as a *Conyza*. The synonyma of Morison, and the *Jaceæ vel Serratulæ adfinis*, were now left out.

Although M. Lamarck had learned from M. Desfontaines, that all the flowers were hermaphrodite, he still continued to call this plant the *Conyza anthelmintica*, and made no change on the synonyma (*Enc. Meth.* ii. 83.).

Willdenow without altering the synonyma (*Sp. Pl.* iii. 1634.), or restoring that of Morison, returned in a great measure to his opinion; and, uniting the *Cattu Schiragam* with several *Serratulas*, followed Schreber in calling the genus *Vernonia*, thus placing it in the natural order of *Cinarocephalæ* instead of *Corymbiferæ;* and I must confess, that with these *Serratulæ*, and some *Eupatoria*, it seems to form an intermediate link between the

the two orders, so that it is scarcely possible to say, where the one ends, and the other begins. It must however be observed, that these *Serratulæ*, which have a *receptaculum nudum*, and which compose the genus now called *Vernonia*, are by Jussieu (*Gen. Plant.* 195.) considered as more nearly allied to *Eupatorium* than to the *Cinarocephalæ*.

Willdenow on the authority of Swartz has chosen to give the genus *Vernonia* a character (pappus duplex, exterior paleaceus, interior capillaris) by no means applicable to the *Bacchariodes* of Linnæus; as I have already mentioned, that this great naturalist states "semina pilis simplicibus coronata." I must further remark, that at least another of the *Vernonias* is in a similar predicament; for it is included in the genus *Suprago* of Gærtner (S. glauca *Gærtn. de Sem.* ii. 402; Vernonia glauca *Willd. Sp. Pl.* iii. 1633.), the character of which is perfectly applicable to the *Cattu Schiragam*, and in which no mention is made of the exterior leafy pappus. We might indeed suspect, that Willdenow had erroneously referred the *Cattu Schiragam* to a wrong genus, the plants included in which have really an exterior leafy pappus; but this is rendered doubtful by a remark of M. Poiret (*Enc. Meth.* viii. 496.), who, speaking of this outer pappus of the *Vernonias*, says, "J'ignore si la prémière (l'aigrette extérieure) est peu sensible ou caduque, je ne l'ai point remarquée dans les espèces que j'ai examinées:" and it must be remarked, that M. Poiret had seen living plants of the three first species of *Vernonia* described by Willdenow, while the authority of the latter, respecting the only other species, is contradicted by that of Linnæus.

This error in Willdenow, although continued in the *Hortus Kewensis* (iv. 502.), probably induced Dr. Roxburgh (*Hort. Beng.* 60.) to reject the *Cattu Schiragam* as a *Vernonia*, and to return to the arrangement of Morison, calling it *Serratula anthelmintica;*

thelmintica; but I must follow Jussieu in thinking, that the *receptaculum nudum* of the *Cattu Schiragam* is a sufficient objection to this classification.

I shall conclude with a description of the *Cattu Schiragam*, and of several other Indian plants of the same genus, which, in imitation of M. Poiret, I shall call *Vernonia*; although the *Suprago* of Gærtner, as his generic character is unexceptionable, and was earliest published, seems to have a preferable claim. Both Poiret and Gærtner unite the *Liatris* of Schreber with the *Vernonia*, and I think with good cause; for there is reason to believe, that in several species, at least of *Liatris*, as well as in all the plants which I have described, the pappus is not really plumose, but only denticulated. I need not repeat the synonyma of the *Cattu Schiragam*, having already explained all that I have to say on the subject.

Vernonia anthelmintica radice annua, foliis ellipticis subsessilibus serratis, foliolis calycinis squarrosis obtusis.

Habitat in Indiæ ruderis.

Radix annua, fibrosa. *Caulis* erectus, basi lignosus, angulatus, villosus. *Rami* sparsi, teretes, recti. *Folia* alterna, subsessilia, elliptica, utrinque acuminata, serraturis acutis incisa, venosa, pilosa, subtus punctata, undulata. *Petiolus* brevissimus, villosus, ramuli rudimento appendiculatus. *Flores* erecti, purpurei; terminales subsessiles, solitarii: laterales insidunt pedunculo unifloro, solitario, tereti, erecto, villoso, ad medium foliato. *Calyx* communis ovatus, squarrosus, imbricatus squamis numerosis, quarum exteriores basi erectæ, ad apicem auctæ appendiculo foliaceo, spathulato, plano, patulo, obtuso: interiores erectæ, lineares, obtusæ, membranaceæ, breviores. *Flosculi* omnes hermaphroditi, æquales, longitudine calycis, infundibuliformes. *Tubus* filiformis

filiformis incurvus. *Limbus* quinquepartitus. *Filamenta* quinque brevissima. *Antheræ* coalitæ. *Germen* teres. *Stylus* filiformis, staminibus longior. *Stigma* bipartitum laciniis revolutis. *Calyx* fructiferus apice connivens. *Receptaculum* nudum, magnum, planum. *Semina* plura, incrassata, angulis pluribus ciliatis striata, ad marginem coronata pilis plurimis denticulatis deciduis; et in centro squamis nonnullis (corollæ rudimenta) persistentibus.

Specimens of the following plants have been deposited in the collection of the East India Company.

Vernonia revoluta caule herbaceo, ramis paucifloris, foliis margine revoluto integerrimis, squamis calycinis dorso carinatis.

Habitat in Camrupæ borealis et Cosalæ graminosis.

Radix crassa, descendens, perennis. *Caulis* spithameus, ad basin ramosus, angulatus, hirsutus. *Folia* alterna, sessilia, linearia, margine revoluto integerrima, acutiuscula, venosa, supra punctata, utrinque pubescentia. *Flores* ad singulorum ramorum apices duo vel tres, purpurei, pedunculis longis alternis squamulosis insidentes. *Calyx* cylindricus, undique imbricatus squamis erectis, dorso carinato planis, pubescentibus, acutis, linearibus. *Flosculi* plures, quinquefidi, calyce longiores, omnes hermaphroditi. *Semina* hirsuta. *Pappus* pilosus, denticulatus, basi in annulum coalitus, deciduus. *Receptaculum* nudum, alveolatum.

Vernonia arborea caule arboreo.

Mogor Bengalensium.

Habitat in sylvis Nepalæ inferioris et Camrupæ.

Arbor mediocris 40 vel 50 pedes alta, ligno utili; *ramis* teretibus, tomento brevissimo indutis. *Folia* alterna, oblongo-ovata,

ovata, basi sæpe inæqualia, acuta, integerrima, punctata, tomento ad nervos brevissimo induta, subcostata, venis valde reticulata, sæpe spithamea. *Petiolus* brevissimus, teres, tomentosus, non stipulaceus. *Corymbi* e foliorum superiorum axillis et terminales, ramis divaricatis teretibus tomentosis fastigiati. *Flores* parvi, pallido purpurei. *Calyx* oblongus, arcte imbricatus squamis pluribus, ovatis, concavis, obtusis, inæqualibus. *Flosculi* sæpius sex, calyce multo longiores, laciniis acutis quinquefidi, omnes fertiles. *Stigmata* duo longius exserta. *Receptaculum* angustum, nudum. *Semina* basi acuminata; apice coronata pappo setaceo denticulato, simplice ordine ad marginem seminis inserto.

Vernonia aspera foliis ellipticis inæqualiter dentatis, supra et hispidis et scabris; panicula ovata.

Eupatorium asperum. *Hort. Beng.* 61.

Habitat in Anggæ montibus.

Huic affines Eupatoria conyzoides Maderaspatana, Virgæ-aureæ villosis foliis, flosculis pallescentibus. *Pluk. Amalth.* 80. *t.* 395. *f.* 7.; sed *t.* 396. *f.* 5. valde diversa.

Eupatorium integro Jacobeæ folio violaceum. *Pluk. Amalth. t.* 394. *f.* 6. quod dubio citatur (*Enc. Meth.* ii. 83.) pro Conyza chinensi; sed foliorum denticuli nimis remoti et profundi.

Caulis sex pedes altus, lignosus, farctus, teres, simplex, hispidus, rigidus: *rami* brevissimi, alterni, in paniculam terminalem densam congesti. *Folia* elliptica, alterna, subsessilia, acuta, inæqualiter dentata, rigida, hispida, costata, nervis subtus prominentibus reticulata, supra scabra, subtus porosa. *Petiolus* brevissimus, non stipulaceus. *Panicula* maxima, erecta, ovata, obtusa ramulis subgeminatis. *Flores* mediocres, purpurascentes, congesti. *Folia* floralia parva, lanceolata.

ceolata. *Calyx* cylindricus, pubescens, imbricatus foliolis linearibus, acutis, inæqualibus, erectis. *Flosculi* circiter octo, calyce duplo longiores, omnes hermaphroditi, quinquefidi laciniis linearibus. *Filamenta* quinque ex apice tubi, laciniis dimidio breviora. *Antheræ* coalitæ. *Stigmata* duo. *Receptaculum* nudum. *Semina* glabra. *Pappus* pilosus, rigidus, denticulatus, imbricatus, pilis exterioribus brevissimis.

OBS. Pappus ut in Suprago glauca Gærtneri (*De Sem.* ii. 402.) *t.* 166. *f.* 5.), quæ Vernonia glauca Willdenovii (*Sp. Pl.* iii. 1633.)

In India I have seen several other species of the same genus; but I shall have again occasion to return to them.

PERAGU, *p.* 41. *fig.* 25.

Commeline gives no commentary on this plant, which Plukenet compared, although with doubt, to his *Arbor baccifera Abutili foliis lanugine ferruginea villosis Punnangannare Malabar* (*Mant.* 19.); but of this we know nothing.

The elder Burman (*Thes. Zeyl.* 66. *t.* 29.) described a plant, which he called *Clerodendron folio lato et acuminato*, and considered as very nearly allied to the *Peragu*. By the Ceylonese this plant, according to Burman, is called *Pinna* (*fortunata*); while the *Peragu* is called *Pinnakola* (*infortunata*), "quæ à priore nil nisi folii rotundiore et magis cordata figura differt;" but I must also say, if we are to judge from the figures, that the two plants differ also much in the form of the corolla, and in that of the calyx when bearing fruit; so that I have scarcely any doubt of their being distinct species. Burman, therefore, considers the *Peragu* as the *Pinnakola* of Hermann; and he also considers it as the *Frutex baccifer, Malabaricus, floribus pentapetalis, binis, una bacca*

bacca nigra in calyce stelliformiter expanso of Ray. To this he joins a plant of Sloane, which in all probability is quite different; and also the *Periclymeni similis, Myrtifolia arbor Maderaspatana* of Plukenet (*Phyt. t.* 211. *f.* 4. *Alm.* 287.), which is no doubt of the same genus, but is a variety of the *Volkameria inermis* of Willdenow (*Sp. Pl.* iii. 383.).

Linnæus in the *Flora Zeylanica* (231.) separated this plant of Plukenet, and united (232.) the *Pinnakola sive infelix et infortunata* of Hermann and the *Peragu* of Rheede with its name in Ray, to the *Clerodendron folio lato et acuminato* of Burman, which, according to Burman, is the *Planta fortunata Pinna Zeylonensibus* of Hermann; so that Burman and Linnæus are here in direct opposition.

In the *Species Plantarum*, as copied by the younger Burman (*Fl. Ind.* 137.), Linnæus gives the *Peragu* the name of *Clerodendrum infortunatum*, omitting to quote Hermann, but quoting the elder Burman, as was done in the *Flora Zeylanica*. Here the difference between the elder Burman on the one side, and the younger Burman and Linnæus on the other, is in fact continued, and one side is thus clearly in error. If the *Pinna* of Hermann has lanceolate leaves, it cannot be the plant for which it is quoted by the elder Burman; if it has cordate leaves, it cannot be the *Clerodendrum fortunatum*. This, however, can only be determined by an inspection of the Herbal collected by Hermann: nor might this even be decisive, as Linnæus complains in the dedication of the *Flora Zeylanica*, that Hermann's collection, after having been in the hands of the elder Burman "per 50 annos fuerat suppressus, indignorum manibus versatus, et in barbarorum hominum scriniis sepultus," before he had access to describe it; and during this period several transpositions of names and specimens are likely to have taken place. That serious injury was done, the language of Linnæus implies. In

the mean time, it seems rather doubtful whether the terms *fortunatum* and *infortunatum* have been correctly applied by Linnæus. At any rate, as they originated in some silly superstition, they might be as well abandoned.

What is of more importance to my subject is, that the younger Burman seems to throw a doubt on the identity of the *Peragu* with the *Clerodendrum infortunatum* of Linnæus by observing, that the former has alternate leaves; and so it appears in the figure, with a view of which Burman as usual contented himself; for in the text it is said, "folia bina et bina proveniunt;" so that the appearance in the figure has arisen from a neglect of the draughtsman.

But, further, I have already said, that the *Clerodendrum folio lato et acuminato* of the elder Burman is different from the *Peragu*; and which of these Linnæus really meant by his *C. infortunatum* I cannot determine. The difference, however, became so obvious, that Willdenow (*Sp. Pl.* iii. 386.) makes them distinct varieties, which in uncultivated plants is nearly the same with distinct species, implying merely two plants, that have a very strong resemblance, although in some points they are not entirely similar.

Willdenow, however, respecting the *Peragu*, committed a great error in quoting as the same the *Petasites agrestis* of Rumphius (*Herb. Amb.* iv. 102. *t.* 49.), which has indented leaves. Willdenow thus under the term *C. infortunatum* comprehends three distinct plants, and the same is done by Gærtner (*De Sem.* i. 271.). Which of the three each author actually meant I cannot exactly say. It is indeed clear, that Gærtner did not mean the *Peragu*, because he represents the calyx of the fruit as not quite so long as the berry, to which it closely adheres; while in the *Peragu* it is much longer than the berry, and spreads out to a distance. He probably, therefore, meant the *Clerodendron* of the elder Burman.

M. Poiret

M. Poiret (*Enc. Meth.* v. 163.) perceived the error of Willdenow respecting the *Petasites agrestis* of Rumphius; but he was scarcely more fortunate in quoting the *Titius litorea* (*Rumph. Herb. Amb.* iii. 39. *t.* 20.) As, however, he afterwards perceived this error, and corrected it (*Enc. Meth. Sup.* iv. 352.), I need not dwell longer on this subject. M. Poiret like Willdenow considers the *Clerodendron* of the elder Burman as a distinct variety from *Peragu*, and to this I have no particular objection.

As the specific name *infortunatum* has perhaps been given to the *Planta fortunata* of the Ceylonese, I should have entirely concurred with the authors of the *Hortus Kewensis* (iv. 63.) and *Encyclopédie* (*Enc. Meth. Sup.* iv. 352.) in calling the *Peragu* the *Clerodendrum viscosum*, had the plant, which they evidently described under this name, been the *Peragu*: but the *C. viscosum* has serrated leaves, and is, I have no doubt, that which Dr. Roxburgh called the *Volkameria infortunata* (*Hort. Beng.* 46.), having been sent by him to Kew Garden. Dr. Roxburgh, however, or perhaps rather Dr. Carey, does not quote the *Peragu*, and in this he acted judiciously; for the leaves of the *C. viscosum* are not only serrated on the edges, but are very seldom, and that but slightly, cordate. We are not therefore yet warranted to reject altogether as species the *Planta fortunata* and *infortunata* of Hermann, and to refer them to the *C. viscosum*. It is true, that neither Dr. Roxburgh nor I have seen the plants; but I cannot think that his *Volkameria infortunata*, which I perfectly know, is either one or other; and to enable the reader to judge, I shall here give some account of the points in which it differs.

Clerodendron viscosum. Enc. Meth. Sup. iv. 252.; Hort. Kew. iv. 63. (excluso synonymo Rheedii.)
Volkameria infortunata. *Hort. Beng.* 46.

Bhengt

Bhengt Bengalensium.
Hnæn-i Barmanorum.
Habitat ubique in Indiæ lucis umbrosis.

Frutex 2—10 pedes altus. *Rami* pilis adpressis strigosi, compressiusculi, non sulcati. *Folia* ovata, vix unquam subcordata, utrinque hispida, nervis inferioribus parvis subalternis costata; inferiora inæqualiter dentata, superiora integerrima. *Panicula* terminalis brachiata, trichotoma, vel dichotoma axillis floriferis. *Calyx* floriferus viridis. *Flores* albi, rubro ad fauces inquinati. *Calyx* fructiferus maxime auctus, patens, sanguineus. *Bacca* globosa, tetrasperma.

Now, if what I have above stated be taken into consideration, I think it will appear that the *Bhengt* of Bengal is different from the *Peragu*, from the *Petasites agrestis*, and from the *Clerodendron* of Burman, all of which have been included in the *C. infortunatum*, and all of which I have endeavoured to show are different from one another.

Peragu folia habet profunde cordata, acuminata, integerrima, velutina, quinquenervia; calyces fructiferos patentes, bacca multo longiores.

Petasites agrestis folia habet dentata, cordata, 5—7-nervia; calycem bacca quadriloba minorem, erectum.

Clerodendron Burmanni folia habet integerrima, obtusiuscula; calycem fructiferum erectum, drupa subrotunda minorem.

NALUGU, *p.* 43. *fig.* 26.

Commeline ventures no commentary on this plant; nor can we place any confidence in the conjectures of Plukenet (*Mant.* 27. 40.), who compares it to two trees, one from the West Indies, and the other from the Cape of Good Hope, which probably have no affinity either to the *Nalugu* or to each other: for, so far as

as we can judge from the imperfect figure of the first (*Phyt. t.* 146. *f.* 1.), it has simple leaves; and the second, from the term *diphyllos*, is probably equally unlike.

Rumphius quotes the *Nalugu* for the *Frutex aquosus mas* (*Herb. Amb.* iv. 102. *t.* 44.), the stem of which is armed with prickles (trunci hinc inde spinulas quasdem gerentes, quæ in ordines locuntur), while that of the *Nalugu* is unarmed. This error, excusable in the blindness of the venerable Dutch Governor, has led to several gross errors, some subsequent writers having blindly followed his quotation.

M. Lamarck (*Enc. Meth.* i. 217.) quoted the *Nalugu* for the *Aquilicia sambucina* of Linnæus (*Mant.* 211.), which he considers as the same with the *Staphylea indica* of Burman (*Fl. Ind.* 75. *t.* 24. *f.* 2.), that is, the *Gingiran* of the Javanese; and he considers the *Frutex aquosus femina* of Rumphius (*Herb. Amb.* iv. 103. *t.* 44.), or *Gangiran Murra* of the Javanese, as a mere variety of the same species, rejecting the *Frutex aquosus mas*, which Rumphius had held to be the *Nalugu*, and which Linnæus quoted for the *Aquilicia sambucina*: but the *Aquilicia sambucina* of Linnæus, the *Staphylea indica* of Burman, and the *Frutex aquosus femina* of Rumphius have bipinnated leaves, while those of the *Nalugu* are simply pinnated. It is true, that M. Lamarck says, "ses feuilles sont une ou deux fois ailées:" but this description, I suspect, is derived from the figures of Rheede and Rumphius united, and not from nature; as he afterwards (ii. 611.) calls it *Gastonia Nalugu foliis pinnatis foliolis serratis*. How he learned that it has ten stamina, on which account he classed it with the *Gastonia*, I do not know; and I suspect, that this opinion may have merely arisen from an expression in the text, which, if fully considered, will not warrant such a conclusion. Rheede merely says, "ex medio florum eminet capitulum album (nectarium) quod in vertice decem denticulis brevibus

vibus emicat, stylum parvum cum globulo (germen), viridi diluto, ex quo prodit, in se recondens." Now the *decem denticuli* may not mean antheræ, as perhaps M. Lamarck concluded, but divisions of the *nectarium*, the antheræ being concealed within the nectarium, as is usual in the genus *Aquilicia*, in which Jussieu (*Gen. Plant.* 294.) includes the *Nalugu*. M. Lamarck afterwards heard (*Enc. Meth.* iii. 460.), that on a comparison of the plants in the collection of Linnæus the *Aquilicia sambucina* was found to be the same with the *Leea æquata*, which, having simply pinnated leaves, may be the *Nalugu*; but it cannot be either the *Staphylea indica* of Burman, or *Frutex aquosus fœmina* of Rumphius; for these plants are probably not the same. If, therefore, by mistake Linnæus described the same plant under two names, it remains to be ascertained whether he described the *Nalugu foliis pinnatis* or the *Staphylea indica foliis bipinnatis*; for the two plants are evidently distinct; and, on account of their unarmed stems, they are also quite different from the *Aralia chinensis*. As, however, M. Lamarck justly observes, this reported discovery in the Linnæan Herbarium was probably a mistake, as long since the author of the *Hortus Kewensis* (ii. 50.), well acquainted with the Linnæan Herbarium, describes the *Leea* (or *Aquilicia*) *sambucina* and *L. æquata* as both growing in the Royal Garden, although he quotes none of the authorities above mentioned (*Enc. Meth. Sup.* i. 410.).

Notwithstanding what Jussieu and Lamarck had said, Willdenow continues to place the *Nalugu* among the synonyma of the *Aralia chinensis caule petiolisque aculeatis*; but this, as I have said, is evidently a mistake.

On the whole, I think it most probable that the *Nalugu* is the *Leea æquata*; and *Leea* is now generally considered as the same genus with *Aquilicia*, some preferring one name and some the other (*Enc. Meth. Sup.* iii. 327.). I suspect, however, that Royen and

and Linnæus actually saw some plant, which had a fructification like what they described by the name of *Leea*; and, although Linnæus may have afterwards by mistake added some species of *Aquilicia* to the original *Leea*, that there exists such a genus as he described, which is allied to the *Sapotæ*, as Jussieu (*Gen. Plant.* 170.) supposes.

The *Nalugu* belongs no doubt to the *Aquilicia* of Jussieu, as he justly observes (*l. c.* 294.); but its place in the natural system is liable to doubt. Its chief resemblance to the *Meliæ*, where Jussieu places it, is in the *tubus staminifer* of the corolla; but in this there is a great difference between the *Aquilicia* and *Melia*, the former having the insertion of the filaments on the outside of the *tubus antheriferus*, while the antheræ are inserted within the tubus of the *Meliæ*. From the structure of the seed, well described by Gærtner, the *Aquilicia* appears also to have a considerable affinity to the *Hedera*; and the *Hedera* is more nearly, perhaps, allied to the *Araliæ* than to the *Caprifoliæ*; so that Linnæus was so far at least justified in uniting the *Nalugu* with the *Aralia*, to which it has also a strong resemblance in the leaves and petiolus, and in these it differs totally from the *Sapotæ* and *Meliæ*; although the flower has a considerable affinity to the former, as the *tubus antheriferus* may be considered as five appendices conjoined; and it is in this junction that the chief difference between the *Leea*, as described by Linnæus, and the *Aquilicia* consists. It must however be admitted, that in both *Hedera* and *Aralia*, and in all kindred plants, the germen is below the calyx, while in the *Aquilicia* it is above. On the whole, the *Aquilicia* is an anomalous genus, not strictly resembling any other yet known.

Among the hills near Mungger I found a plant, that in the form of its leaflets bears a striking resemblance to the *Nalugu*, which I consider to be the *Leea æquata*; but in place of being a

bush ten or twelve feet high, it is a herb not higher than a yard; its stem is smooth; and its inferior leaflets are sometimes again composed of three. In the collection presented by me to the East India Company, I have called it *Leea herbacea*; but I am not certain that the circumstances I have mentioned are sufficient to establish it as a distinct species from the *Nalugu*; it may perhaps be considered as merely a variety; and I should even consider it as entirely the same, were there any hint in the *Hort. Mal.* that the inferior pinnæ of the *Nalugu* are ever subdivided; for there is no mention of the *Nalugu* having a hairy stem, as is said to be the case in the *Leea æquata*. What Rheede says of the leaflets of the *Nalugu* is applicable also to the *L. herbacea*, and serves to distinguish both from the *Staphylea indica* of Burman or *Leea sambucina*. "Folia (foliola) in margine rotundis denticulis incisa, et crispa lateribus versus interiorem partem contractis.—Ex costa (media) costæ binæ et binæ—obliquo annulari ac parallelo ductu proxime ad marginem exeunt ac reflexa in se invicem incurrunt."

I shall now add a description of the *Leea herbacea*, which in the vulgar Hindwi dialect is called *Govarai*, and in the more polished language of physicians, *Amarphul*.

Caulis herbaceus, 2 vel 3 pedes altus, simplex, supra folia nodosus, glaber, obtusangulus. *Folia* ima ternata, superiora cum impari pinnata, pinnis imis aliquando ternatis. *Foliola* opposita, oblongo-ovata, acuminata, inæqualiter serrata, nervo ad marginem parallelo costata, venis minute reticulata, supra glabra, subtus pilosa, petiolata, remota. *Petiolus* basi membranaceo subvaginans, tetragonus, angulo superiore profunde sulcato. *Rachis* ad foliola nodosa. *Cyma* axillaris vel terminalis, indeterminate divisa, ramulis glabris, acutangulis. *Flores* parvi, virides. *Calyx* turbinatus ore quinque-

quinquelobo, obtuso, erecto. *Petala* quinque oblonga, acuta, apice subcucullata, unguibus tubo staminifero adnata. *Tubus staminiferus* turbinatus, petalis brevior, extra sulcis quinque exaratus, ore inter sulcos quinquefido lobis emarginatis. *Filamenta* quinque ex imis tubi sulcis enata, apicibus intra tubi os incurva, petalis opposita. *Antheræ* intra tubum retroflexæ, subcoalitæ, oblongæ. *Germen* superum subrotundum. *Stylus* teres. *Stigma* simplex.

The same structure of flower I have found in the *Leea macrophylla* of Dr. Roxburgh (*Hort. Beng.* 18.), and in the plant that I consider as the *Staphylea indica* of Burman, which I suppose is the *Leea Staphylea* of the *Hortus Bengalensis* (*l. c.*), and which Dr. Roxburgh considered as distinct from the *Leea sambucina*, meaning probably by this the *Frutex aquosa fœmina* of Rumphius, although he quotes neither Rumphius nor Burman for either plant, deterred probably by the great confusion in different authorities. It may however be observed, that the parts of the flower might be otherwise denominated, as thus: *Corolla* monopetala. *Tubus* crassus, brevis, ad os coarctatum auctus tubo staminifero turbinato extra sulcis quinque exarato, ore quinquedentato, denticulis laciniis corollæ alternis, emarginatis. *Limbus* patens, quinquepartitus. *Filamenta* quinque laciniis corollæ opposita, ex apice tubi ad basin sulcorum enata. I had an opportunity of comparing the fruit of the *Leea macrophylla* with the description of the *Aquilicia Otillis* in Gærtner (*De Sem.* i. 275.), and found them exactly similar in structure.

Niruri, *p.* 45. *fig.* 27.

Commeline in comparing this to the *Vitis Idæa* is far from accurate; and his observation is uncommonly defective, as he commences with saying, that the plant had not been previously described; while he then says, that he cannot doubt of its being

one and the same with the *Frutex indicus bacciferus*, *Vitis Idææ secundæ Clusii foliis* of Breynius.

Plukenet in his *Phytographia* (*t.* 69. *f.* 3.) delineates a plant, which he calls *Vitis Idææ species Maderaspatana*, *Niruri forte Malabarensibus dicta*, *Hort. Mal.* 2., which would seem to imply a doubt of its being the same with the *Niruri*: but for this doubt I see no good reason, the two figures very strongly resembling each other. He also in this work quotes Breynius with doubt, although in the *Almagestum* (391.) this is not expressed, as he was then probably satisfied of the plants being the same.

The elder Burman (*Thes. Zeyl.* 198. *t.* 88.) describes a plant, very like the *Niruri*, under the name of *Rhamnus zeylanicus*, *folio subrotundo*, *glabro*, *caulibus hirsutis*, *spinis exiguis*, *ad ramorum et foliorum ortum exasperatus*, *flosculo spadiceo*, *bacca nigra*; but he quotes neither the *Niruri*, the plant of Breynius, nor that of Plukenet above mentioned. On the contrary, he quotes, although with uncertainty, the *Acaciæ forte cognatus e Maderaspatana frutex* of Plukenet (*Phyt.* *t.* 122. *f.* 4.), stating, however, that as it had neither fruit nor flower, he could not be certain. Burman adds as synonymous a plant of Sloane, probably from Jamaica. There is, however, notwithstanding the most striking resemblance, an essential difference between the *Rhamnus zeylanicus* and *Niruri*: the former has flowers divided into four, while those of the latter are divided into five, have probably five stamina, and certainly only two styli; but the *quinque flavi noduli ad orificium floris*, which I have interpreted antheræ, may be five glandular bodies in a female flower.

Soon after Linnæus, with his usual contempt for preceding authors, chose to give the name *Niruri* to a plant totally different from the *Niruri* of Rheede, and which Rheede had indeed described under the name *Kirganeli*.

The younger Burman called the *Rhamnus zeylanicus* of his father

father *Rhamnus Vitis Idæa*, and added to his synonyma the plant of Breynius, which Commeline and Plukenet conjectured to be the *Niruri*. He omitted with great propriety that of Sloane. The *Rhamnus Vitis Idæa* continued undisturbed, until Retzius, probably from the notes of Kœnig, described a plant, which he took to be the same with the *Rhamnus*, and called it *Phyllanthus Rhamnoides* (*Enc. Meth.* v. 298.). Although M. Poiret admits this identity, yet I have no doubt of both authors having been mistaken; for the stem of this *Phyllanthus* is only "un peu frutescente, glabre, et divisée en rameaux glabres. Dans les fleurs males, les calices sont tronqués. Le fruit est une capsule." But in the *Rhamnus zeylanicus* of Burman, "Rami subhirsuti; flosculus tetrapetalus; bacca nigra;" and in the *Niruri*, "frutex altitudine septem vel octo pedum, rami tenuiter pilosi; flores constantes quinque foliis rotundis; fructus forma plano rotundioli, intus cum maturi sunt succo aqueo cæruleo repleti. In hisce parva semina, quæ angusta sunt, continentur." The *Phyllanthus rhamnoides* therefore is neither the *Rhamnus Vitis Idæa* of the younger Burman, that is, the *Rhamnus zeylanicus* of his father, nor the *Niruri*, so nearly allied to it, which is the plant of Breynius, that has been also quoted for the *Phyllanthus Vitis Idæa*.

Willdenow, (*Sp. Pl.* iv. 580.) however, for the *Phyllanthus rhamnoides* quotes the plant described by Retzius; and in the *Encyclopédie Méthodique*, the *Rhamnus Vitis Idæa* of the younger Burman, the *Rhamnus zeylanicus* of the elder Burman, the *Acaciæ forte cognatus* of Plukenet, and the *Frutex indicus baccifer* of Breynius, which is the *Niruri*. Little dependence can however be placed on his accuracy; for, as M. Poiret justly observes (*Enc. Meth. Sup.* iv. 408.), he had previously quoted (*Sp. Pl.* i. 1102.) both the *Rhamnus zeylanicus* and the *Acaciæ forte cognatus* for the *Zizyphus* or *Rhamnus lineatus*, which the latter may be, although M. Poiret, on comparing specimens, thinks that the

the *Frutex sinensis* &c. of Plukenet (*Amalth.* 100. *t.* 408. *f.* 3.) has a better claim. With respect, however, to the *Rhamnus zeylanicus* of Burman, it cannot be the *Rhamnus lineatus* of M. Poiret, the flowers of which are divided into five, while those of Burman's plant are divided into four. The division in the former would agree with the description of the *Niruri*; and in the figure of this both the calyx and corolla in some of the flowers may be distinctly observed: but then the *Rhamnus lineatus* as described by M. Poiret has only one stylus, and the figures of the leaves in Plukenet's *Amaltheum* (*t.* 408. *f.* 3.) is by no means like the *Niruri*. It is true, that the *Rhamnus lineatus* is by Willdenow made a *Zizyphus*, and should therefore have two styli (although he places it in the order *Monogynia*), in which respect it agrees with the *Niruri*; but then there is nothing in the foliage of the *Niruri* like the *costæ oppositæ transversæ*, from whence the *Rhamnus lineatus* derives its name; nor are its leaves terminated by a small spine, but are large and blunt exactly like those of the *Rhamnus zeylanicus* of Burman, which, as M. Poiret observes, differ a good deal from those of his *Rhamnus lineatus*. On the whole I am inclined to think, that the *Niruri* is really a *Rhamnus*; for although it has two styli, yet its flowers seem to want the flat discus of the *Zizyphus*, and its fruit is evidently a berry containing several seeds, and not a drupa containing one nut. Several *Rhamni*, it must be observed, and in particular the *circumscissus*, the nearest plant to the *Niruri* that I know, have two styli.

Hummatu, *p.* 47. *fig.* 28.

Commeline justly observes, that this and the two following are all species of *Datura* or *Stramonium*; but he mentions no circumstance, by which we can refer the synonyma of Acosta and Clusius, which he quotes, to this species. That of C. Bauhin (*Solanum fœtidum pomo spinoso oblongo*) does not belong to this, which

which has *pomum subrotundum*, but to the *D. Stramonium* of Linnæus. This mistake in the older writers has occasioned the virtues of the *Hummatu* to be referred to the *D. Stramonium* (*Enc. Meth.* vii. 460.), which does not grow in Malabar: but it is not unlikely, that both plants may have nearly the same powers.

The name *Dotiro*, given to this plant by the Brahmans of Malabar, is evidently the same with the *Dutra* or *Dhutura* of the Gangetic provinces, corrupted from the *Dhustura* of the Sanscrita. This name has spread under the various corruptions of *Dutroa*, *Daturo*, *Datura*, *Datula*, and *Lutroa* to Europe, Turkey, Persia, and the great archipelago of Asia; and, having been unknown to the Greeks and Romans, would seem to show, that India is the proper native country of this plant; although other species, introduced in modern times from Egypt and America, have acquired the same name among botanists.

The *Hummatu* is by Plukenet called the *Stramonia seu Dutroa fructu spinoso rotundo, flore candido* (*Alm.* 358.), while its double variety is his *Stramonia indica flore amplo albo pleno*, a name taken from Breynius. He has added to its synonyma two belonging to American plants, which probably should rather have been referred to the *Datura Stramonium*: and at the same time he considers as different the *Stramonia s. Datura pomo spinoso rotundo longo flore* (*Alm.* 358.). I believe that the chief difference between the two plants is in the colour of the flower, which in the latter is purple. This, however, in a plant half cultivated, and therefore liable to considerable variation, is an insufficient distinction. Among the synonyma which Plukenet quotes for the *Hummatu*, is the *Stramonium minus s. Nux Metel flore albo* of Parkinson, who called it thus, because a kindred plant is the *Metel* of the Arabic language. This latter was called *Nux Metella* or *Metel* by the early botanists, who procured it from Egypt: but it is with justice probably considered

as

as different from the *Hummatu* by Plukenet, who calls it *Stramonia Ægyptiaca fœtida, semine pallido, pomo spinoso rotundo, flore violaceo simplice, duplice, tripliceve* (*Alm.* 358.). We have thus two Indian and an Egyptian *Stramonium* so nearly allied to each other, if they be really distinct, that they can with difficulty be distinguished; for nothing that Plukenet says is sufficient for this purpose, if we set aside the colour of the flower.

The elder Burman under the name *Stramonium zeylanicum* (*Thes. Zeyl.* 221.) seems to mean only the second variety of the Indian kind with a purple flower; although he mentions among the synonyma the three *Hummatus* of Rheede, and the three kinds of *Stramonia indica* described by Rumphius (*Herb. Amb.* v. 242.), which by many are considered as different from those of Rheede.

Linnæus (*Fl. Zeyl.* 86.) disapproved of the separation made by Plukenet on account of the colour of the flower, and along with the *Hummatu*, which has a white flower, joined the *Datura zeylanica violacea* of Hermann or *Stramonium zeylanicum* of Burman, calling his plant *Datura pomis nutantibus globosis.*

As, however, the above-mentioned character would have included also the *Nux Metella* of the Arabs, which he did not intend, Linnæus in the first edition of the *Species Plantarum*, copied by the younger Burman (*Fl. Ind.* 53.) from among the synonyma above mentioned, formed two species. The *Hummatu* with its synonyma, adding the *Dutra alba* of Rumphius (*Herb. Amb.* v. 242. *t.* 87. *f.* 1.), he perversely called *Datura Metel*, while the true Egyptian *Metel* of the Arabs, or *Nux Metella* of the early botanists, he called *D. fastuosa.* In itself this is a proper enough name, because the flower is often double or triple, and then becomes very showy; but if any species were to be called *Metel*, that certainly should have the name, which is so called in the country where it grows spontaneously. But further,

further, both the varieties of the Indian plant are often found in a double or triple form, and are therefore equally entitled to the appellation *fastuosa*.

What Willdenow says concerning the *Datura Metel*, after having the advantage of the second edition of the *Species Plantarum*, and of several accounts by excellent botanists, is liable to great objections, so far as relates to the *Hummatu*. He distinguishes it as *pericarpiis spinosis*, *foliis cordatis subintegris*, and adds, *calyx non angulatus sed teres:* but the figure of the *Hummatu* has not cordate leaves, and the angles on its leaves are fully more prominent and sharper than those of the *Dutra rubra* (*Herb. Amb.* v. 243. *t.* 87. *f.* 2.), which Willdenow quotes for the *D. fastuosa:* and further, the calyx of the *Hummatu* is most evidently angular. The description entirely agrees with the figure. "Folia in oris in cuspides seu angulos sinuata. Calyx quinque costis, quæ in foliorum (laciniarum) cuspides incurrunt, in longitudine striatus." It must be further observed, that there is no indication whatever, either in the figure or description, of the *Hummatu* being pubescent; but I must confess, that no great stress can be laid on this point, because on the subject of pubescence Rheede is often negligent. The only other circumstance, by which Linnæus endeavours to distinguish the *Datura fastuosa* from the *Metel*, is, that the former has *pericarpia tuberculata* and the latter *pericarpia spinosa:* but, if the *Dutra rubra* of Rumphius be the *D. fastuosa*, as Linnæus admits, its pericarpium is fully as much entitled to the appellation *spinosum*, as that of the *Dutra alba*; and he is equally silent respecting the pubescence of his plant.

M. Poiret (*Enc. Meth.* vii. 461, 462.) gives the synonyma of the Egyptian and Indian species at greater length than Willdenow, and I have great deference for his opinion and confidence in his accuracy; yet I can discover nothing in his account to

remove the difficulties above stated. The same is the case, with what is said in the *Hortus Kewensis* (i. 387.), where the *Hummatu* is the only authority quoted for the *D. Metel*, with Willdenow's inapplicable specific character. As however Linnæus, Willdenow, Poiret, and the author of the *Hortus Kewensis* had the living plants before them, we cannot doubt of there being two distinct species: but then the *Hummatu* is not the *D. Metel calyce terete;* nor the *Dutra rubra* the *D. fastuosa pericarpio tuberculato vel lævi.* On the whole, I am persuaded that the *D. alba nigra et rubra* of Rumphius are mere varieties of the same species, and not different from the *Hummatu*; for although in one of his figures the calyx is concealed by a leaf, so that its angles cannot be seen, yet both have spines on the capsules. I must leave to those who have an opportunity of seeing the Egyptian plant, to determine the difference between it and the *Hummatu* in a manner more satisfactory than has been yet done.

Dr. Roxburgh (*Hort. Beng.* 16.) had both a *Datura fastuosa* and a *D. Metel;* and at one time at least, I know, considered them as mere varieties; but it is possible that he may have afterwards found another species, the *Dhutura* of the natives, and called it *Metel*; while what the natives call *Kala* (black) *Dhutura*, the *Dutra nigra* of Rumphius, he received as the *D. fastuosa* with both single and double flowers. In the western provinces of Gangetic India I have indeed found a plant called simply *Dhutura* or *Dutra*, abundantly different from the *Kala Dhutura*, the *Hummatu*, and all the varieties of the *Stramonia indica* of Rumphius; and this may be the plant which Dr. Roxburgh latterly called *D. Metel*, although it more resembles the Linnæan character of the *D. Stramonium* than that of the *Metel*, and has much smaller flowers than the latter. Specimens of this will be found in the collection which I have presented to the East India Company.

NILA

Nila Hummatu, *p.* 49. *fig.* 29.

Mudela Nila Hummatu, *p.* 51. *fig.* 30.

These evidently belong to the same species of plant, and differ merely in the first having a simple, and the latter a triple flower, to which variation the *Hummatu* of India and Egyptian *Nux Metella* are also liable, as appears from my commentary on the last plant.

Commeline does not make any observation on these plants; but Plukenet entirely coincides with the opinion above stated of the *Nila Hummatu* and *Mudela* N. H. being one species, which he calls *Stramonia indica fructu oblongo glabro* (*Mant.* 176.). He also proposes as a query, if this be not the same with the *Leum Alrachaha* (i. e.) *Nux Mechil Serapionis* of J. Bauhin: but the *Nux Mechil* of Serapion is probably the same with what our early writers called *Nux Metella*; and this plant should therefore be the *D. fastuosa*. It must indeed be observed, that in several points this agrees with the character which Linnæus and other more recent botanists give of the *D. fastuosa*; for its calyx is represented without angles, and its fruit without spines. In the figures indeed it appears quite smooth; but in the description it is mentioned "fructus alii glabri, alii gemmulis hinc inde rigidis et valde nitentibus obsiti," which agrees with the *pericarpium tuberculatum* of Linnæus. So far is well; but then in the *Nila Hummatu* we have *pericarpium ovatum erectum*, *folia subintegra*, while in the *D. fastuosa* we should have *pericarpium globosum nutans*, *folia angulata*. Neither is the *Nila Hummatu*, nor its double variety, quoted at all by the younger Burman, by Willdenow, by Poiret, by Aiton, nor Roxburgh. We are thus left in uncertainty: but on the whole I am inclined to think, that in reality the *Hummatu* of Rheede and the three kinds of the *Stramonia indica* of Rumphius are mere varieties of each other,

and are the *D. Metel* of Linnæus; while the *Nila Hummatu* and *Mudela Nila Hummatu* are his *D. fastuosa*, the *Nux Metella* of ancient botanists not described by Rumphius; although I must confess that it may be a species not noticed by Linnæus. If my supposition is well founded, a careful revision of the synonyma, and more accurate specific characters will be necessary; and at the same time more appropriate specific names should be given; for I think there cannot be a doubt that Linnæus had in view the double flowers, when he gave the name *fastuosa:* but this circumstance is common to both species; and it is surely absurd to give the Arabic name *Metel* to a species different from that known to the Arabs.

ERICU, *p.* 53. *fig.* 31.

BEL ERICU, *p.* 56. no *fig.*

Commeline had seen what he took to be these plants growing in the gardens of Holland, and this seemingly in the open air; for he says, "procurrunt instar lolii, nisi coerceantur," which they would scarcely do in the pots of a stove or greenhouse. One other observation which he makes, renders the identity of his plants with those of Malabar more doubtful. He says, "minime accensendæ sunt fruticibus, sed herbis, quia caules et folia earum quotannis intereunt:" but the *Ericu* and *Bel Ericu* are strong shrubs; and, so far as I have observed, carry leaves, flower and fruit throughout almost the whole year (hic frutex in anno ter flores perfert). From the roots of Commeline's plant being able to resist the winters of Holland, it is not likely to be a plant of Malabar; but it may possibly be the *Beid el Ossar* of Veslingius, a plant of Syria, which may be an herbaceous plant, as Commeline asserts. But then Commeline in his synonyma introduces a plant from Egypt, and one from North America, the latter of which at least there is not any probability of being

being the same with the *Ericu*. At any rate the *Ericu* and *Bel Ericu*, with which I am perfectly acquainted, are mere varieties, differing only in the colour of the flower, as Rheede justly observes; and the white colour, in general at least, seems to be the effect of cultivation, as I have seen such only in gardens, where it is reared as being supposed to have greater virtues; and it is on this account probably that the Brahmans of Malabar prefix *Davi* (divine) to its name.

Plukenet considered the Egyptian, Syrian and Indian plants different (*Alm.* 35.); calling the first *Apocynum erectum majus latifolium ægyptiacum flore luteo spicatum* (*Alm.* 34.); the second *Apocynum latifolium syriacum, incanum, erectum floribus umbellatis minoribus, obsolete purpurascentibus, siliquis folliculatis rugosis*; and the third *Apocynum erectum majus latifolium indicum, flore concavo amplo, carneo suave purpurascente*. So far is well; but in his synonyma there is great confusion. For the Indian species he quotes the *Ericu*, which is proper; but joins with it the *Apocynum latifolium Ægyptium incanum erectum floribus magnis pallide purpureis* of the *Par. Bat. Prod.*, which may perhaps be the Syrian kind or *Beid el Ossar* of Veslingius, but cannot be the Egyptian kind, called *Beid el Ossar* by Alpinus, which has yellow flowers. For the Syrian kind, again, he rightly quotes the *Beid el Ossar* of Veslingius with purplish flowers above mentioned; but then he adds the *Bel Ericu*, which certainly is a mere variety of the *Ericu* with white flowers. He also follows Commeline in adding to this an American plant, as I have said, probably different from both. Further, for his Indian kind he quotes a figure in the *Phytographia* (*t.* 175. *f.* 3.), which certainly does not represent the *Ericu*; although in the explanation of the plate he says that it is meant to do so; but then he adds, that it also represents the *Beid el Ossar* of Egypt, the *Apocynum syriacum* of J. Bauhin, and the *Lapathum ægyptiacum lactescens siliqua Asclepiades*

piades of his brother Caspar, all of which synonyma belong to the Egyptian species, of which this figure may be a good representation, although he has by mistake quoted it for the Indian kind.

The elder Burman makes matters no better. The *Ericu* he calls *Apocynum indicum, maximum, floribus amplis, Ianthinis, obsoletis* (*Thes. Zeyl.* 24.), joining with it the *Beid el Ossar* of Egypt, and nearly all the synonyma given, right or wrong, by Plukenet to his Egyptian, Syrian and Indian kinds; only excluding the *Bel Ericu*, which he calls *Apocynum indicum, sylvestre, inodorum, siliquosum, seminibus papposis, floribus albis amplis* (*Thes. Zeyl.* 25.). By mistake he seems to have called this the *Idda* of the Ceylonese; for that he really meant the *Bel Ericu* there is no doubt from his quotation of Commeline: but Linnæus considered the *Idda* as his *Nerium foliis lanceolato-ovatis, ramis divaricatis* (*Fl. Zeyl.* 109.), which has become the *N. divaricatum* of Willdenow (*Sp. Pl.* i. 1236.). On this account Burman's plant is now quoted as a *Nerium*; although if Linnæus had observed that the *Idda* was the *Apocynum zeylanicum indicum frutescens, Nerii flore candidissimo* of Hermann's *Paradisus*, and not the *Apocynum erectum incanum latifolium, Malabaricum, floribus omnino albis* of the same work, which is quoted by Burman, he would have discovered the latter author's error respecting the *Idda*, and would not have removed Burman's plant from the *Bel Ericu* to join it with a *Nerium*, or more probably a *Tabernæmontana*, which I suspect the *Idda* is. See my commentary on the *Curutu Pala* (*Hort. Mal.* i. 83.)*.

In the *Flora Zeylanica* (112.), excellent in general on synonyma, Linnæus made little improvement respecting the *Ericu*, joining it with the *Beid el Ossar* of Egypt, the *Ericu americana* of Seba, and the figure erroneously referred to it by Plukenet in the *Phytographia*, as already mentioned; and thus probaby

* *Trans. Linn. Soc.* xiii. p. 519.

united

united three species in one, although he seems then to have learned that the Syrian kind is distinct. He adds, however, greatly to the confusion respecting these plants by describing the plant as herbaceous, and the leaves smooth. It is therefore probable, that then he had not seen the *Ericu*, but described from the plant common in the gardens of Holland; or at least from some plant, which cannot well be any one of the three, that he quotes as synonymous: but to this I shall again return.

Rumphius, under the name *Madorius* (*Herb. Amb.* vii. 24. *t.* 14, *f.* 1.), has given an excellent account of the *Ericu* and *Bel Ericu*, in which he justly considers the kind with the white flower as not differing from that of which the flower is purple. His figure, as usual, is not so good as his description; but, from what he says of the nectarium, there can be no doubt of his meaning this species. "In floris centro mira conspicitur compositio, pedem exhibens salinarii argentei, componitur nempe ex quinque circinnis et superne gerit pentagonum caseolum." Now the five circinni clearly describe the lower parts of the nectaria spirally revolute, which distinguish this species. The elder Burman in his commentary produced nothing new. Nor did his son (*Fl. Ind.* 71.) improve the synonyma, but adopts the specific name *A. gigantea*, given by Linnæus in the *Species Plantarum*, and leaves us completely in the dark which of the plants included in the synonyma he meant to describe. He does not quote the *Madorius*.

M. Lamarck (*Enc. Meth.* i. 280.) separates the Egyptian from the Indian kind, so as to make them varieties of the same species, calling the former *Asclepias gigantea* α, and the latter *A. gigantea* β; but he points out no difference between the two kinds, except that the flowers of the former are yellow inclining to red, and in the latter of a red inclining to violet, which does not well agree with the flower of the *Ericu*. From his description it would

would appear, that the plant he meant grew as high as a man, and was covered every where with a white wool, except on the upper side of the leaves: so that he probably described a kind different from that "caule herbaceo foliis glabris," which Linnæus described in the *Flora Zeylanica*. From his synonyma it would appear, that Tournefort, in himself an host, considered the Egyptian, Syrian and Malabar kinds as different species. Along with the first Lamarck only quotes as synonyma the *Beid el Ossar* of P. Alpinus, *Miller's Dictionary*, and an account by Jacquin. Along with the Malabar plant of Tournefort, he quotes the *Ericu* of Rheede, Plukenet and Seba. The latter is an American plant; and he admits that Plukenet's figure represents badly the plant he meant to describe, and no wonder; for, as I have said, it was only quoted by mistake for the *Ericu*, and probably represents the *Beid el Ossar* of Egypt. Even therefore in the *A. gigantea* β of Lamarck we have three plants united. Following Linnæus in his second edition of the *Species Plantarum*, and subsequent works, M. Lamarck (281.) describes the Syrian plant as a different species (*A. syriaca*); and to this probably belong (although not quoted by Lamarck) all the synonyma quoted by Plukenet for the Syrian kind, except the American plant of Parkinson, which is perhaps the *A. purpurascens* (*Enc. Meth.* i. 281.), or at least the *Apocynum erectum noveboracense foliis minus incanis, flore ex obsoleto dilute purpurascente* of Hermann, which was possibly the herbaceous smooth-leaved plant described by Linnæus, and which no doubt would thrive in the open air of Holland.

Willdenow (*Sp. Pl.* i. 1263.) totally separates the *A. gigantea* α of Lamarck, that is, the plant of Jacquin quoted by the French botanist, from the *Asclepias gigantea*, calling it *A. procera*. For this he quotes, but with doubt, the plant figured by Plukenet as above mentioned; and also, with a similar doubt, the *Beid el Ossar*

Ossar of P. Alpinus, which would seem to imply, that he rightly considered these as the same, but doubted of this Egyptian plant being his *A. procera*, which is a native of Persia. For the *A. gigantea* the only figure quoted by Willdenow (*Sp. Pl.* i. 1264.) is the *Ericu*, and that of Seba, said to represent the American plant. Although he does not quote the *Madorius*, he advances, on the authority of Rumphius (vii. 25.), that this plant kills cattle unaccustomed to its use. The only authority for this is Knox, in his account of Ceylon, who attributes such powers to a plant, which he calls *Capita gauha* (*Capita herba*), and which Rumphius, on very inadequate grounds, considers as the *Madorius*. Where M. Lamarck procured his account of the virtues of this plant I cannot say: "Son suc laiteux est acre et caustique; elle cause le mort aux animaux qui en mangent." The latter part is evidently taken from Knox: on what weak foundations the former part rests we may judge from Rumphius, "lac amaricans, adstringens ac tandem in ore nauseosum dulcescens, sine ulla tamen ardore vel acredine." The plant, however, is much used in medicine by the natives of India, and from its sensible qualities may be possessed of considerable powers. In Bengal the milk mixed with salt is applied to rheumatic swellings, and the leaves heated with butter are applied to the same complaint.

Willdenow in describing the *A. syriaca* (*Sp. Pl.* i. 1265.) quotes some of the synonyma, which Plukenet and Commeline had erroneously conjoined with the *Bel Ericu*, and especially the *Beid el Ossar* of Veslingius, which Willdenow properly states to be different from the *Beid el Ossar* of P. Alpinus: but he conjoins with it an American plant, and would at first sight seem to consider America as its only proper country. "Habitat in Virginia, circa Astracan." We cannot however suppose, that he thought Astracan a place in Virginia; and must allow that, by a

typographical error, the word *et* has been omitted, which led to such an appearance. It is, however, the Virginian plant of Parkinson alone that is now considered as the *Asclepias syriaca* (*Hort. Kew.* ii. 80); but the plant of Veslingius, although afterwards confounded with an American, was no doubt a native of Syria, and probably of the same genus with the *Ericu*. On the whole, Willdenow brings us back nearly to the opinion of Tournefort, giving us an Egyptian, an Indian, and a Syrian species; and we have also an American kind, all of which by one or other have been confounded with the *Ericu* or *Madorius*. It is true that he quotes with doubt the Egyptian kind for his *A. procera*, which is a native of Persia; but still he admits the Egyptian plant to be different from both the Indian and Syrian.

Linnæus early stated, that the flower of his *A. gigantea* differed considerably from that of the other species of this genus; and Mr. R. Brown in his valuable treatise on the *Asclepiadæ* separated it from them, and called the new genus *Calotropis*; for with other recent botanists he seems to have altogether overlooked the *Madorius* of Rumphius, whose name, as previously given, should no doubt be retained. In the *Hortus Kewensis* the *Asclepias gigantea* of Willdenow and the *Ericu* are the only authorities quoted for the *Calotropis gigantea*. What the former is I cannot say, as with the *Ericu* it conjoins the American plant of Seba, and the *Asclepias foliis amplexicaulibus oblongo-ovalibus basi pilosis* of Linnæus (*Fl. Zeyl.* 112.), which is certainly not the *Ericu*, as I have already said. Of the *Ericu* I shall now give a description, in order that those who have an opportunity of examining the *Beid el Ossars* of Egypt and Syria, at present excluded from the botanical system, may have the means of pointing out how far they differ.

Calotropis

Calotropis gigantea. Hort. Kew. ii. 78.
C. nectariis basi spiraliter revolutis, apice trifidis.
Asclepias gigantea. *Hort. Beng.* 20. *Willd. Sp. Pl.* i. 1264?
Burm. Fl. Ind. 71?
Asclepias gigantea β. *Enc. Meth.* i. 280?
Apocynum indicum maximum, floribus maximis, Ianthinis, obsoletis. *Burm. Thes. Zeyl.* 24. (exclusis variis synonymis).
Madorius. *Herb. Amb.* vii. 24. *t.* 14. *f.* 1.
Apocynum erectum majus latifolium Indicum, flore concavo amplo, carneo suave purpurascente. *Pluk. Alm.* 35. (excluso icone *Phyt. t.* 175. *f.* 3. et synonymorum nonnullis.)
Ericu. *Hort. Mal.* ii. 53. *t.* 31.
Akondo Bengalensium.
Ma-io Barmannorum.
Habitat ubique in Indiæ arenosis vulgatissima planta.

Radix ramosa, alba, late per arenam diffusa, sed repentem non vidi. *Caulis* 5 seu 6 pedes altus, e basi statim ramosus, perennis. *Rami* medulla multa lignosi, compressi, uti tota planta lactescentes, tomento albo farinaceo induti. *Folia* rigida, opposita, internodiis longiora, subsessilia, basi retuso subcordata, ultra medium latiora acuta, integerrima, crassa, plana, costis alternis venosa, juniora tomento albo induta, cujus pars in adultis evanescit, præsertim e pagina superiore. *Petiolus* brevissimus, tomentosus, apice supra folii basin substrigoso. *Pedunculus* communis interfoliaceus, solitarius, rigidus, alternus, compressiusculus, albido tomentosus, multiflorus. *Pedicelli* subumbellati, teretes, flore longiores, colorati, tomentosi. *Bracteæ* vix ullæ. *Flores* magni, in planta hortensi albi, sed in spontanea purpurascentes, ante maturitatem subcordati, obtusi, quinquangulares, lateribus apicem versus gibbis. *Calyx* minimus, basi corollæ

adhærens, quinquepartitus, laciniis ovatis concavis acutis. *Corolla* basi plano quinquefida laciniis ovatis acutis planis patulis; marcescentibus reflexis, margine revolutis. *Filamenta* in tubum cylindricum quinquesulcum connata. *Antheræ* quinque foliaceæ biloculares, ad latera stigmatis adhærentes. *Pollinis* grana geminata ex stigmatis angulis. *Corona staminea* simplex composita ex corpusculis quinque compressis, dorso filamentorum ad sulcos longitudinaliter adnatis, apice incurvo tridentato in antheras incumbentibus, basi obtuso spiraliter revoluto genitalia ambientibus. *Germina* duo. *Styli* subulati. *Stigma* maximum, truncatum, margine pentagono acutangulo cinctum. *Folliculi* duo inflati, glabri, mucrone recurvato semiovati, rugosi, in dorsum sulco longitudinali exarati, ad sulcum marginibus ad receptaculum centrale inflexis dehiscentes. *Parietes* intus fibroso inflatæ.

In the central districts of Gangetic India I have found a species differing from the preceding in only a few particulars mentioned below, and which may be the *Calotropis procera* of Persia, if that be different from the *Beid el Ossar* of Egypt with a yellow flower, which is certainly not the same with this Indian plant.

Calotropis procera? nectariis apice bifidis, basi acuto adscendentibus.

Calotropis procera. *Hort. Kew.* ii. 78? *Enc. Meth. Sup.* v. 591? ubi errore Caloptris dicitur.

Asclepias procera. *Willd. Sp. Pl.* 1263?

Asclepias gigantea α. *Enc. Meth.* i. 280? (exclusa planta flore flavo Egyptiaca.)

Habitat in Mithilæ Magadhæ et Cosalæ arenosis.

Tota planta a *C. gigantea* nihil diversa flore excepto minore.

Flores

Flores ante maturitatem orbiculati, depressi, extra albido-subrubicundi, intus purpurei, odorati; at herba graveolens. *Corollæ* basis convexus, laciniæ erectæ. *Coronæ* corpuscula basi acuto recurvo adscendentia, apice bifido patula. *Folliculi* mucrone recto acuminati.

I have seen still another *Calotropis*, which, on account of its simple herb-like stem and smooth leaves, may possibly be that described by Linnæus in the *Flora Zeylanica*, although the form of its leaves is different. I shall here however give an account of it.

Calotropis Acia nectariis apice trilobo incumbentibus, basi subulato patentibus.

Asclepias foliis oblongo-ovalibus amplexicaulibus. *Linn. Fl. Zeyl.* 112? (exclusis synonymis nisi forte Hermanni omnibus.)

Aki Hindice.

Habitat in Mithilæ borealis sylvis.

Caulis lignosus, 2 vel 3 pedes altus, simplex, compressus, ut tota planta lactescens, apice indutus tomento albido evanido. *Folia* opposita, rigida, internodiis longiora, petiolata, basi obtusiuscula sed semper omnino integra, acuta, elliptica, integerrima, plana, crassa, costis alternis raris subvenosa, tomento albo maturitate omnino evanescente induta. *Petiolus* brevissimus, sed multo quam in *C. gigantea* longior, apice supra folii basin substrigoso. *Pedunculus* communis interfoliaceus, solitarius, rigidus, alternus, compressus, albido tomentosus, multiflorus, subbifidus. *Pedicelli* subumbellati, teretes, uniflori, flore longiores, tomentosi. *Bracteæ* plano-subulatæ, parvæ, ad pedicellorum basin. *Flores* magni, extra albidi, intus purpurei, ante maturitatem ovati acuti foveis quinque magnis insculpti. *Calyx* corolla dimidio

midio brevior, erectus, quinquepartitus laciniis lineari-lanceolatis, acutis. *Corolla* basi plana, ultra medium quinquefida laciniis patulis ovatis, medio utrinque sinu magno inflexo insculptis. *Filamenta* crassa coalita in tubum germina involvens cylindricum. *Antheræ* quinque membranaceæ, biloculares, lateribus stigmatis incumbentes. *Grana* pollinis geminata ad angulos stigmatis annexa. *Corona* e corpusculis quinque crassis, compressis, dorso filamentorum adnatis, stigmate brevioribus, basi acuto patente recurvis, apice trilobo incumbentibus. *Germina* duo supera. *Styli* duo breves, subulati. *Stigma* unicum, capitatum, stellato-pentagonum, acutangulum, medio supra convexum. *Folliculi* duo, uno tamen plerumque abortiente, ovales, hinc gibbosiores, pulverulento-tomentosi. *Parietes* crassissimæ, carnosæ. *Receptaculum* fungosum, lineare, planum, hinc parietibus adnatum, undique seminibus papposis imbricatum.

Corpusculum *C. gigantææ.*

Corpusculum *C. procerææ.*

Corpusculum *C. Aciæ.*

AVANACOE seu CIT AVANACU, *p.* 57. *fig.* 32.
PANDI AVANACU, *p.* 60. no *fig.*

These two are mere varieties, such as usually occur in plants that are much cultivated: and Commeline in his observation is perfectly justifiable in saying, "inter se admodum magnitudine differt ratione soli et loci in quo crescit. In quibusdam locis fit arbor, in aliis vero non excrescit ultra quatuor quinqueve pedum altitudinem." When sown thick on a poor soil, I have seen it ripen its fruit within the year from being sown, and not rising above three feet: it was ploughed down immediately on producing its first crop; but, when planted on a good soil, with plenty

plenty of room for air, it runs up to be a small tree, is later of flowering, and produces fruit annually for many years. In short, what I have said concerning the variety of the Cotton plant in my commentary on the first part of the *Hortus Malabaricus**, is almost entirely applicable to the *Avanacoes*, which, as Commeline observes, are both varieties of the *Ricinus vulgaris* of C. Bauhin.

Plukenet, however, was not satisfied with this, but considered the *Cit* (*alba*) *Avanacu* as different from the common kind, and as being the *Ricinus Americanus major caule virescente* (*Alm.* 319.), while the *Pandi Avanacu* he calls *Ricinus africanus maximus caule geniculato rutilante* (*l. c.*). With respect to the last he may be right, in so far that the *Pandi Avanacu* may be the same with the plant he means; but he has not attended to what Rheede says respecting the *Cit Avanacu*, "cujus duæ species sunt, una cortice viridi communi, altera rubro." If, therefore, the colour of the stem is to make a difference, both the species of *Cit Avanacu* cannot belong to the American plant, which Plukenet quotes. Although I call this an American plant, I have no doubt that India is the original country of the *Ricinus*, and that it has been carried to America as a plant highly useful: for I must here observe, that very few if any plants were originally common to the East and West Indies. Plukenet indeed (*Alm.* 111.) entertained a contrary opinion, "Experientia enim nos docuit, quamplurimas Indiæ orientalis plantas etiam in America reperiri;" and this opinion has been followed by none more than by Linnæus: but I am confident, that the spontaneous vegetable productions of the two countries are totally different; and daily experience is now showing, that the plants of Sloane and Rheede, which were at one time considered as the same, differ in some remarkable circumstance.

The elder Burman (*Thes. Zeyl.* 206.) joins properly the *Ava-*

* *Trans. Linn. Soc.* xiii. p. 492.

nacoe

nacoe and *Pandi Avanacu* into one species, including both the American and African varieties.

Rumphius admirably describes the *Cit Avanacu* under the name of *Ricinus albus* (*Herb. Amb.* iv. 90.), noticing a double variety *domesticus et sylvestris*, of which the former has a tinge of red, while the latter is entirely pale. He also describes the *Pandi Avanacu* under the name of *Ricinus ruber* (*l. c.* 97. *t.* 41.), and considers them as distinct.

Linnæus, when he published the *Flora Zeylanica*, seemed to be of the same opinion; for he mentions only one species of *Ricinus* (339.), and quotes for it the *Cit Avanacu* alone. He justly considers it as the *Ricinus vulgaris* of C. Bauhin, which Plukenet and the elder Burman had rejected.

The younger Burman (*Fl. Ind.* 306.), following Linnæus, calls this species of the *Flora Zeylanica*, *Ricinus communis*, thus needlessly changing the name given by C. Bauhin; for Linnæus, it must be confessed, amidst many great qualities, was an insatiable innovator. Burman justly considers the *Ricinus albus* and *ruber* of Rumphius as the same; but quotes only the *Cit Avanacu*, although there cannot be a doubt that the *Ricinus ruber* and *Pandi Avanacu* are precisely the same. Finally, he quotes none of the authors who call the plant either African or American.

M. Poiret (*Enc. Meth.* vi. 201.) gives at great length the synonyma of the *Ricinus communis*, and I believe with great judgement, including in this species the *Ricinus albus* and *ruber* of Rumphius as well as the *Avanacu* of Rheede, by which he no doubt meant the *Cit Avanacu*. He considers the *Ricinus ruber* and the African plant as belonging to the same variety, and does not quote the *Pandi Avanacu*, probably because Rheede gives no figure.

Willdenow soon after (*Sp. Pl.* iv. 564.) endeavours to divide the species of M. Poiret into four distinct species, adding a fifth

from

from Jacquin, which I presume is also a mere variety. As, however, Willdenow saw all the five plants living, I beg to be understood as speaking with all due deference to the opinion of a very excellent botanist. All that I can say is, that I have seen four kinds of the *Ricinus* very commonly cultivated in India, and I think that there is nothing said by Willdenow to enable one to distinguish his plants from those I have seen. It is very possible, however, that this botanist may really have seen four different species, although from not having had an opportunity of seeing the *R. communis* in all its stages and varieties, he may not have selected the characteristic distinctions with sufficient accuracy. This I the more readily believe, because in the *Hortus Kewensis* (v. 331.) four of Willdenow's plants are mentioned as distinct species, without quoting either Rheede or Rumphius. Yet M. Poiret, in the Supplement to the *Encyclopédie*, seems to adhere to his former opinion, and does not think any alteration necessary; and Dr. Roxburgh considered that he had seen only one species in India (*Hort. Beng.* 69.).

I shall now mention the four varieties commonly cultivated in Bengal, and must observe, that two of them are evidently included by Rheede under the *Cit Avanacu*, "cujus duæ species sunt, una cortice viridi-communi, altera rubro." Both these are almost always cultivated for the seed, and are therefore sown close, so as to stint their growth, and thus bring them early to flower; and, when they have ripened their seed, they are destroyed by the plough, a new sowing being more productive than if they were allowed to grow for several years: for, as Rheede observes, they will grow to be shrubs seven or eight feet high. Both are indiscriminately called by the natives *Arinda*, and often grow in the same field.

1. R. caule subherbaceo fistuloso viridi pulverulento, stigmatibus bifidis.
   Ricinus communis. *Willd. Sp. Pl.* iv. 564?
   Ricinus albus sylvestris. *Rumph. Amb.* iv. 90.
   Cit Avanacu cortice viridi. *Hort. Mal.* ii. 57.
2. R. caule subherbaceo rubro pulverulento, stigmatibus bipartitis, foliis lividis.
   Ricinus lividus. *Willd. Sp. Pl.* iv. 565?
   Ricinus albus domesticus. *Herb. Amb.* iv. 90.
   Cit Avanacu cortice rubro. *Hort. Mal.* ii. 57.

The other two varieties by the natives are called *Pat* (leaf) *Arinda*, because they are chiefly cultivated for their leaves, on which a large kind of silk-worm* is reared for spinning a coarse silk called *Arindi*. On these accounts they are usually planted in hedges round the huts of those who rear the worms; and being allowed to stand for years, acquire a considerable size.

3. R. caule lignoso solido viridi.
   Ricinus viridis. *Willd. Sp. Pl.* iv. 564? (exclusis synonymis).
4. R. caule lignoso solido rubro lævi, petiolis medio et apice glandulosis, stigmatibus bipartitis, foliis lividis.
   Ricinus africanus. *Willd. Sp. Pl.* iv. 564?
   Ricinus ruber. *Herb. Amb.* iv. 97. *t.* 41.
   Pandi Avanacu. *Hort. Mal.* ii. 60. "a *Cit Avanacu* in eo tantum differt, quod altius assurgat, quodque stipitibus et ramis est valde rubris seu miniatis et nitentibus."

It can scarcely, I think, be supposed, that the trifling difference between *stigma bifidum* and *s. bipartitum*, in a plant much and long cultivated, can be considered as sufficient to establish a distinction of species.

* Phalæna (Attacus) Cynthia, *Drury* ii. *t.* 6. *f.* 2. *Cramer* iv. 39. *f.* A. *Trans. Linn. Soc.* vii. *p.* 42. *t.* 3.

The

The fifth species of Willdenow, *R. inermis*, which also M. Poiret considers as a mere variety of the *R. communis*, shows on what slight grounds even the genus *Ricinus* rests, as several species of *Croton* differ in nothing else from the *Ricinus* but in having a smooth capsule. We perhaps may therefore return to the classification of Pliny (*l.* 15. *c.* 6.), who considers *Croton* as another name for the *Ricinus*; and we ought thus to include in one genus with the *Ricinus* all the plants that have a similar flower, without attention to the mere external covering of the capsule. By this we should include not only several species of *Croton*, but also some of the *Jatrophæ*, which have exactly the habit of the *Ricinus*: but these genera, as they now stand, can be distinguished by no character common to all the species.

Cadel Avanacu, *p.* 61. *fig.* 33.

This plant is one of the Linnæan species of *Croton*, a genus concerning which I have given my opinion when treating of the *Nilicamaram* in the Commentary on the first part of the *Hortus Malabaricus**. It is not, however, one of these which could be associated with the *Ricinus* or *Croton* of the ancients, as mentioned above: yet the affinity is sufficiently strong to justify the natives of Malabar in including it in their genus *Avanacu*. It must, however, be observed, that the generic character of the genus *Avanacu* given by Rheede (64.) is remarkably deficient, what he says being only applicable to the two first species. *Japalu*, the name by which the Brahmans of Malabar call this plant, is merely another orthography for the *Jipala* of the Sanscrita, the name of a tree that will be afterwards described.

According to Commeline the seeds of this plant, which are a valuable though drastic purgative, were originally known by the name of *Pinei nuclei Molucani*; but, when he published this

* *Trans. Linn. Soc.* xiii. *p.* 503.

work, they were known in the shops by the name of *Cataputia minor*; although they were sold by itinerants under the name *Grana Dilla* or *Grana Tilli*, which latter name by the time of Plukenet had in a great measure prevailed, as the *Cadel Avanacu* was by him called *Ricinus orientalis cujus fructus sunt Pinei nuclei Molucani a nobis putati et Grana Tilli officinarum* (*Alm.* 320.; *Mant.* 162.).

The elder Burman quotes the *Cadel Avanacu* for his *Ricinoides Indica, folio lucido, fructu glabro*, and (*Thes. Zeyl.* 200.) gives us the synonyma of preceding authors at great length, and with more care than he usually bestowed on the subject. The seeds then were called *Grana Tiglia*; and it had been discovered that the older botanists had described the seeds by one name, taking them for the production of a Pine, while the plant producing the seed, without this circumstance having been known, was described by the name of *Lignum Moluccense* or *Pavana*. The figure which Burman gives (*t.* 90.) represents the leaves as having three nerves meeting at their base; but in the figure of Rheede there are five nerves. We have no account of the flower from the latter; but Burman says, "flores masculini calycem nullum habent, petala octo, stamina sedecim." He also says, "Frutex hic caules gerit simplices, qui nascuntur sine ramis lateralibus, apice flores in spicam longam collectos gerentes—ad radicem spicæ duo rami egrediuntur ejusdem structuræ cum caule, et sic continuatur secundum ætates." This implies, that the plant which he described had in Linnæan language *caulem fruticosum dichotomum, e ramorum divaricatione fructiferum*, which is by no means applicable to the figure of Rheede. These circumstances will perhaps render it doubtful whether the plant, which Burman described and figured, was actually the same with the *Cadel Avanacu*, although Rheede agrees with Burman in calling his plant a shrub (*frutex*), not very reconcileable with the

the idea of its producing the *Lignum moluccense*, which implies the plant being a tree.

The *Granum Moluccum* accordingly of Rumphius (*Herb. Amb.* iv. 98. *t.* 42.), to which no doubt the greater part of the synonyma quoted by Burman belong, and which Rumphius considered as the *Cadel Avanacu*, is a small tree (*arbuscula trunco brachium vel pedem crasso, in paucos divisa ramos*), to which the term *frutex* would not be very applicable; and, speaking of Rheede's account of the *Cadel Avanacu*, Rumphius says, "in toto isto capite nil memoratur de acri atque urente ipsorum qualitate, quæ in cunctis hujus arbusculæ partibus detegitur." Further, in his figure Rumphius represents the capsules *ovatæ*, while in the figure of Rheede they are *turbinatæ*. These circumstances are perhaps insufficient to convince any one of a specific difference between the plants of the two botanists; although I think that they give room for a suspicion that calls for further examination. One circumstance may serve to throw light on the subject. Rumphius speaking of the capsule says, "intus sunt tres cameræ, in quavis continetur ossiculum cameram non replens." Whether or not this last circumstance be the case in the *Cadel Avanacu* I am not sure, but Rheede gives no hint of it.

Linnæus in the *Flora Zeylanica* (343.) joins the shrubs of Burman and Rheede, with their synonyma, to his *Croton foliis ovatis glabris acuminatis serratis, caule arboreo*, which, in one respect at least, would seem to have most resemblance to the *Ricinoides* of Burman, as he says, "racemus ex divaricatione caulis." Whether, however, Burman was wrong in calling the *Gajapala* of the Ceylonese a shrub, or whether Linnæus described the same plant with Burman, I have no means of ascertaining. The former does not quote Rumphius, who agrees with him respecting the size of the plant.

Burman the younger (*Fl. Ind.* 304.) adopts from Linnæus the specific name *Croton Tiglium*, defines his plant as in the *Flora Zeylanica*,

Zeylanica, and quotes as synonymous the *Ricinoides* of his father, the *Granum Moluccum*, and the *Cadel Avanacu*.

M. Lamarck (*Enc. Meth.* ii. 208.) continues the same synonyma and specific character, and seems to have described from specimens in the herbarium of Jussieu; for he mentions several circumstances not previously noticed by the authors I have enumerated. He calls it a tree of a middling size. He gives five divisions to the calyx, five petals, and about sixteen stamina. He mentions that the young leaves are dotted with hairs disposed in form of a star; and he takes no notice of the cells of the capsule being much larger than the seeds. He mentions its being a cultivated plant, of which I find no traces in former authors. The figure of the fruit which he gives (*Ill. Gen. t.* 790. *f.* 2.) represents it shaped like that of the *Cadel Avanacu*, and having the seeds as large as the cavities.

Willdenow (*Sp. Pl.* iv. 543.) continues the synonyma, but adds a new specific character, omitting the *caulis arboreus* and adding *racemus terminalis*. If he had attended to what Burman stated, he might have seen that this last was not to be depended on; for, although the raceme in the plant of Burman appears at first terminal, yet two young shoots, proceeding from its base, soon leave it "in divaricatione caulis," as Linnæus has it. His specimens, however, were probably in a young state, and had "racemos facie terminales," as he described. He says nothing to extricate us from the doubts respecting the identity of the plants described by Rheede, Burman and Rumphius.

In the *Hortus Kewensis* (v. 327.) Rheede alone is quoted; yet the plant was sent to the garden by Dr. Roxburgh, whose *Croton Tiglium* is a large tree (*Hort. Beng.* 69.) called *Jamalgota* in the language of the vicinity. The specimen of this, which I have given to the collection of the East India Company, has no fruit; but it has 15 stamina, a circumstance that deserves particular attention.

Gærtner

Gærtner for his *Croton Tiglium* (*De Sem.* ii. 119.) continues to quote Rheede, Rumphius and the elder Burman. He mentions nothing of the remarkable smallness of the seeds compared with the containing-cells noticed by Rumphius; but in the figure the seeds seem to fill the cells entirely; and he describes the capsule as quite smooth (*glabra*) without mentioning its shape, which in the figure, however, is much liker the *Cadel Avanacu* than the *Granum Moluccum*.

In India I have found two trees certainly distinct, yet both agreeing so well with the later accounts of the *Croton Tiglium*, that I am uncertain to which I should refer the name; and I have to regret that, not aware of all the difficulties attending the subject, I paid less attention in describing one of them than was necessary: but I have given specimens of both to the collection of the East India Company; and there is little doubt that the one I have most fully described is the *Croton Tiglium* of Dr. Roxburgh, and therefore of the *Hortus Kewensis*; but, as it is a middle-sized tree, there is some doubt of its being either the *Cadel Avanacu* or the *Ricinoides* of Burman. Rheede says nothing of the flower of his plant, and therefore there is more room for admitting the identity of it than of the *Ricinoides*, the numbers in the male flowers of which are quaternary, while in my plant they are quinary: but I shall now describe it, and leave others to judge. It must however be premised, that, although the seeds of the *Cadel Avanacu* of Malabar, of the *Ricinoides* of Ceylon, and of the *Grana Tilli* of Molucca, have all a drastic purgative quality, this is no proof their being one species, those of the *Ricinus communis* and *Jatropha Curcas* having similar powers.

However much I may be displeased with the genus *Croton*, I know too few of the species to venture on a new arrangement, and new names. The specific characters which I give are merely intended to distinguish the two plants from each other.

Croton

Croton Jamalgota staminibus quindecim, semine loculum implente.

Croton Tiglium. *Enc. Meth.* ii. 208? *Hort. Beng.* 69. *Hort. Kew.* v. 327.

Jamalgota Hindice.

Konibish Bengalensium.

Habitat ubique in Bengala.

Arbor mediocris ramulis teretibus, glabris, ad apicem sulcatis. *Folia* alterna, petiolata, oblongo-ovata, denticulis apice glandulosis serrata, acuminata, nitida, punctis raris piloso-stellatis maturitate evanescentibus aspersa, quinquenervia. *Petiolus* subpentagonus, canaliculatus, apice recurvus, brevis, pilorum stellulis aspersus *Stipulæ* binæ laterales, subulatæ, minimæ, erectæ. *Glandulæ*, præter eas apicibus denticulorum folii insidentes, duæ, ad marginem folii paulo supra petioli apicem adnatæ. *Racemi* floriferi terminales, erecti, simplices. *Flores* parvi, virides, subternati, pubescentes: superiores masculini, inferiores feminini.

MASC.: *Calyx* quinquefidus. *Petala* quinque lanceolata, lanata. *Filamenta* quindecim distincta, receptaculo lanato inserta. *Antheræ* biloculares.

FŒM.: *Calyx* quinquefidus persistens. *Germen* superum, ovatum, maximum. *Styli* tres longi, ultra medium bifidi, filiformes, decidui. *Stigmata* simplicia. *Capsula* erecta, magnitudine nucis Moschatæ oblonga, scabra, trigona, sex-sulca, trilocularis. *Semina* loculos implentia, solitaria, apici receptaculi insidentia, integumento osseo nigra. *Arillus* albus.

The description by M. Lamarck of his *Croton Tiglium* differs in nothing, except in his saying "les fruits sont glabres, marqués de trois sillons—coques brunes ou rousseatres:" but these differences of themselves are too trifling to give room for a separation;

tion; and especially as I was describing from fresh, and M. Lamarck from dried specimens.

The other species I found first in the kingdom of Ava, and since in the north-east parts of Bengal. In Ava I took it for the *C. Tiglium*, and under that name sent specimens to the Court of Directors, by whom they were given to Sir J. Banks: but specimens from Bengal have since been presented to the Collection of the East India Company.

Croton Pavana staminibus decem, seminibus loculo multo minoribus.

Granum Moluccum. *Herb. Amb.* iv. 98. *t.* 42?

Habitat ad Avæ et Camrupæ pagos.

Arbor ramulis nitentibus, viridibus, nudis. *Folia* alterna, petiolata, ovata, glabra, acuminata, subtrinervia, serrata. *Glandula* utrinque marginalis ad petioli apicem. *Stipulæ* laterales, setaceæ. *Racemi* floriferi terminales, fructiferi, ramulo utrinque prodeunte, e rami bifurcationibus. *Flores* pedicellati, parvi, superioribus masculinis, inferioribus femininis.

Masc.: *Calyx* planiusculus. *Petala* quinque. *Stamina* decem, distincta.

Fœm.: *Calyx* quinquefidus. *Styli* tres bifidi. *Capsula* pendula, trigona, turbinata, depresso-punctata, hispida, loculis semine multo majoribus inflata.

Although I have little doubt that this is the plant of Rumphius, which is no doubt the real *Tiglium*, yet as this name has been affixed to the other species by two excellent botanists, I do not wish to occasion further confusion, and prefer the other name, by which the plant was known to older botanists. The principal difference which I observe between this and the plant of Rumphius is, that the latter, to judge from the plate, has

capsula ovata. It is true, that the Burmas assured me that they often eat the leaves as a vegetable; while Rumphius says "in tota planta, ac potissimum in ejus foliis vehemens detegitur fervor, ipsum superans Piper." Little reliance is however to be placed on the assertions of the Burmas who accompanied me, they being mostly boatmen, and persons who would be diverted by deceiving a stranger in such particulars, as I know by sad experience, having been almost choked in attempting to eat an *Arum*, which they pretended to be remarkably good. We cannot either rely much on the figure of Rumphius, as his blindness prevented him from detecting errors in his draughtsmen. What he says in the description respecting the fruit is entirely applicable to my plant.

CODI AVANACU or CADI AVANACU, *p.* 63. *t.* 34.

In 1814 this plant had been lately sent by Mr. Ker to the Botanical Garden at Calcutta from China; so that Dr. Roxburgh may not have seen it there; nor is it included in the Catalogue of Plants growing there, published by Dr. Carey. But there I found it thriving, and have given specimens to the Collection of the East India Company. The name *Cadi* on the figure is no doubt a typographical error, as is clear from the Arabic characters; yet it is now generally quoted.

Commeline admits that this plant has been erroneously classed with the *Ricinus*; but mentions its affinity with the *Lathyris* of C. Bauhin, one of the genera united by Linnæus with *Euphorbia.* Plukenet, however, admits of a resemblance to both, and calls it *Ricinus malabaricus fruticescens, Lathyridis facie, fructu in foliorum alis echinato* (*Alm.* 321.). The affinity to the *Euphorbia* is so strong, as to have induced Hermann to call it *Tithymalus tenellus Indicus foliis Linariæ raris,* the *Tithymalus* being another of the genera united by Linnæus with *Euphorbia.*

The

The elder Burman, however, considered it more allied to the *Chamælea*, now called *Cneorum*, and called it *Chamælea foliis linearibus, flosculis spicatis, echinato fructu* (*Thes. Zeyl.* 59. *t.* 25.); but his figure is not so good as that in the *Hortus Malabaricus*, the stem being represented too slender, and the leaves too thickly set:—the principal defect in the figure of the *Hort. Mal.*, as Burman justly remarks, being in the edges of the leaves, which are represented as too deeply indented. Burman, although his figure does not represent it, describes the edges well, "in ambitu levissimis et tenuissimis dentibus seu crenulis serrata;" so that, notwithstanding the differences between his figure and that of Rheede, I have little doubt that they meant the same plant: although I must confess, that the term *foliis Linariæ raris* of Hermann is little applicable to the figure of Burman. He adds as synonymous an American plant of Plumier, probably quite different.

Linnæus in the *Flora Zeylanica* (335.) joins it in the same genus with the *Pee Cupameni* (*Hort. Mal.* x. 163. *t.* 82.), a plant as different as well possible, both belonging to the same natural order, and calls it *Tragia foliis lanceolatis obtusis integerrimis.* Besides the *Codi Avanacu* and *Chamælea* of Burman, Linnæus quotes as synonymous two plants of Hermann, which Burman did not consider as belonging even to the same genus: the *Pitta Gædi ghus* he considers as an *Esula* (*Thes. Zeyl.* 95.), and the *Dya Nelli* he considers as a *Tithymalus* (*l. c.* 225.). I suspect here some mistake, and that the three plants of Hermann are distinct: but without examining his herbarium nothing certain can be known on this subject; nor, if it be found that Hermann actually meant three different plants, can it be ascertained which Linnæus meant, without inspecting his collection. One expression, besides the *folia integerrima*, leads me to doubt of his having really seen the *Codi Avanacu*; for he says, "supra divi-

suras caulis oritur spica cum unico flosculo femineo." Now, in the *Codi Avanacu* the spica is not situated as thus described, but is axillary, as Ray indeed expressly notices; for he called the plant *Lathyris frutescens fructu in foliorum alis echinato.*

The younger Burman, having had the advantage of the *Species Plantarum*, calls this plant *Tragia Chamælea*, and omits altogether the *Esula* of his father; but continues as synonymous with the *Codi Avanacu* his *Chamælea* and *Tithymalus*, already quoted, although the latter is an aquatic plant, while the *Codi Avanacu* grows in sandy and rocky places. Which he meant I cannot say.

If, therefore, the *Chamælea* of Burman was the plant which Linnæus described, the *Tithymalus* of Burman seems to have been wisely omitted by Willdenow (*Sp. Pl.* iv. 326.), who gives a new specific character, in which the *folia integerrima* are omitted. In quoting Rheede he follows the error of the plate, and in quoting Burman he perverts the cyphers, having table 52 in place of 25.

M. Poiret (*Enc. Meth.* vii. 726.) continues the synonyma as left by the younger Burman, and gives a specific character including the *folia integerrima*. He had not seen specimens, and seems to have drawn his account almost entirely from the elder Burman.

In the *Hortus Kewensis* (v. 256) the *Cadi* (*Codi*) *Avanacu* alone is quoted, and the plant seems to have been sent by Dr. Roxburgh; but whether he had sent seed procured from the coast of Coromandel, where he had seen and described the plant (*Tragia Camolia*, *Hort. Beng.* 103.), or whether he had sent part of the seed procured from China, I cannot say: but the plant which I found growing at Calcutta from the last-mentioned seed, is no doubt the *Codi Avanacu.*

ANA CHUNDA, *p.* 65. *fig.* 35.

The name *Chunda* of the text, in the figures is written *Schunda*, and in this form is usually quoted by authors. By the natives of Malabar it is confined to plants "quæ omnes frutices sunt spinosi;" but in Carnata, where the word is pronounced *Sunda*, and in Draveda, where it sounds *Shunday*, the prototype taken for the genus is unarmed. The specific term *Ana* given to this species implies Elephant, an idea that has probably some good foundation, as it has extended to Ava, the natives of which call this plant *Zhæn Ka-ram* (*Elephantis Solanum*). The *Vaingani* of the Malabar Brahmans is no doubt derived from the same source with the *Baigun* of Gangetic India, and the specific name *Sada* implies white.

Commeline is perfectly right in considering the *Chundas* as *Solanums*; but he was certainly mistaken in considering this as the same plant with the *Juripeba fœmina* of Piso, a plant of Brazil, which is very likely to be the *S. stramonifolium* of Willdenow (*Sp. Pl.* i. 1044.), a West Indian plant, confounded, no doubt on account of great similitude, with the *Ana Chunda* by M. Lamarck (*Enc. Meth.* iv. 300.), and thence supposed to be a native of India.

Plukenet erred probably as much as Commeline in supposing this to be the *Solanum spinosum maxime tomentosum* of Sicily (*Alm.* 351.), while the *Juripeba fœmina* he transferred to another plant from Madras, which he supposed to be the plant on which I shall next comment.

The elder Burman unites the *Ana Chunda* with many synonyma, several of which certainly do not belong to it; and among others the *Juripeba fœmina* already mentioned, along with American plants described by Sloane and Plumier, which may indeed be the same with the plant of Piso. The plant to which

which Burman unites the *Ana Chunda* and the *Juripeba fœmina*, is the *Solanum zeylanicum, spinosum, folio amplo incano ad pediculum strictiore* of Plukenet (*Alm.* 350.; *Phyt. t.* 226. *f.* 6.), which is the *Solanum cuneifolium* of M. Poiret (*Enc. Meth. Sup.* iii. 765.); but it seems to be a quite different plant from the *Ana Chunda*. To it, however, probably may belong the other synonyma quoted by Burman, except the *Trongum agreste* of Rumphius (*Herb. Amb.* v. 240.), under which name are included three species, all however quite different from the *Ana Chunda*.

The younger Burman (*Fl. Ind.* 56.) quoted the *Ana Chunda* for the *S. ferox baccis calyce obtectis*; but Willdenow (*Sp. Pl.* i. 1059.) has justly rejected this quotation. In fact, no European botanist, except perhaps Morison, since the time of Rheede, seems to have seen this plant, until Dr. Roxburgh described it under the name of *S. hirsutum*, which I found he had done previous to my return from Ava in 1795. At this time I transmitted by this name specimens that were given to Sir Joseph Banks. But the name was not published in any printed work until 1814 (*Hort. Beng.* 17.), previous to which the plant had been named *S. lasiocarpum* (*Enc. Meth. Sup.* iii. 774.), rather a hard name, but which has the advantage of prior publication. M. Poiret quotes a plant from Morison as being the same with his *S. lasiocarpum*, and no doubt his specific character clearly designates the *Ana Chunda*; but whether Morison had seen the plant, or merely described from Rheede, I cannot say. Under the name *S. lasiocarpum* I have deposited specimens in the Collection of the East India Company.

CHERU CHUNDA, *p.* 67. *fig.* 36., where the name is written SCHERU SCHUNDA.

This name is no doubt the same with the *Schira Schuna*, quoted by Willdenow (*Sp. Pl.* i. 1049.) from *Miller's Dictionary* (probably

bably some German translation); but the plant for which this is quoted is totally different from that of Rheede.

Commeline considers the *Cheru Chunda* as the same with the *Jurepeba mas* of Piso, a Brazilian plant, which Willdenow I believe calls *Solanum paniculatum*; but he only quotes the *Jurepeba*, without stating whether he meant the *mas* or *fœmina*. Commeline's conjecture, however, concerning both *Jurepebas* seems equally ill-founded.

Contrary to Commeline, but equally wrong, Plukenet transferred the plant, which he took to be the *Scheru Schunda*, from the *Jurepeba mas* to the *Jurepeba fœmina*, as formerly mentioned. He quotes indeed the *Scheru Schunda* with doubt (*Alm.* 351.), and I think that the figure which he gives of his plant (*Phyt. t.* 316. *f.* 4.) represents the *S. Jacquini*, although Willdenow quoted it erroneously for his *S. sodomæum* (*Sp. Pl.* i. 1043.), as M. Poiret justly observes (*Enc. Meth. Sup.* iii. 742.).

The elder Burman considered the *Cheru Chunda* as the same with his *S. frutescens, villosum, foliis undulatis, mollibus, subtus incanis, spinis flavescentibus armatum* (*Thes. Zeyl.* 220. *t.* 102.), in which he seems right; but very little dependence can be placed on his synonyma, some of which probably belong to the *S. Jacquini*. He says that its Ceylonese name is *Tubuthu*, of which Linnæus takes no notice.

The younger Burman united the *Cheru Chunda* and his father's *Solanum* last mentioned with an American plant of Dillenius, which Linnæus at first (*Fl. Zeyl.* 94.) took to be the same with the *Malabathu* of the Ceylonese, mentioned by the elder Burman (*Thes. Zeyl.* 218.) as quite different from the *Tubuthu* or *Cheru Chunda*, and called by him *Solanum indicum, spinosum, frutescens, maximum, villosum totum fructibus croceis*. Linnæus indeed admits, that the plant of Dillenius differs a little from the *Malabathu* of Burman; and it is equally different from the

Cheru

Cheru Chunda, which Linnæus did not at first quote; although in the *Species Plantarum*, as copied by the younger Burman, he afterwards considered it as the same with the plant of Dillenius, and removed the *Malabathu* to the *S. mammosum*, also an American plant (*Fl. Ind.* 56.). The *Cheru Chunda* and *Solanum frutescens* (*Burm. Thes. Zeyl.* 220.) of India now therefore became united with the American plant of Dillenius, common in the conservatories of Europe, and was called *S. indicum*, until Willdenow and Lamarck omitted the *Cheru Chunda*, which, although one of the most common and generally diffused plants in India, seems for a long time to have been altogether neglected. I should, however, have no doubt in calling it *Solanum indicum*, had not Linnæus, when he first defined the species, since called *S. indicum* (*Fl. Zeyl.* 94.), meant the *Malabathu*, and not the *Tubuthu* of the Ceylonese, which last is the *Cheru Chunda*. But allowing that Linnæus afterwards considered the *Tubuthu* (*Burm. Thes. Zeyl. t.* 102.) to be his *S. indicum*, as is admitted by Lamarck and Willdenow, although he may have erroneously quoted for the same an American plant of Dillenius, and although this is common in the gardens of Europe, are we to consider the American plant as the true *S. indicum*, and to give other names to the Indian plants of Burman, one or other of which Linnæus no doubt meant to describe? This indeed is what has been done by M. Dunal (*Enc. Meth. Sup.* iii. 743.), who properly separates the American and Indian plants, and gives their synonyma correctly; but he calls the American *S. indicum*, and the Indian *S. violaceum*, an unfortunate name, as the flowers are often white, and as already occupied by another plant (*Brown Nov. Holl.* i. 445.). In the former name he is supported by the *Hortus Kewensis* (i. 402.), which for the *S. indicum* quotes the plant of Dillenius alone, continuing however to state, that this grows in both Indies: but who ever saw in India this plant of Dillenius?

There

There is a plant, however, that approaches very near to the *Cheru Chunda*, and which it will be necessary to distinguish. I found it first in my journey to Mysore, where it is called *Gula*, and in 1806 I gave specimens, a drawing, and a description of it to Sir J. E. Smith. I believe it is the same that Dr. Roxburgh called *S. diffusum* (*Hort. Beng.* 17.); but, as I am by no means certain, I shall continue the name *Gula*, and describe the plant, in order to prevent its being confounded with the *Cheru Chunda*, which from their great similitude is likely to happen. The smoothness of the berry itself is an objection to its being considered as the *S. ferox*, unless we suppose that the hairiness of the calyx, which conceals the berry, was confounded by Linnæus with hairs on the berry itself.

Solanum Gula caule lignoso aculeato, foliis ovatis sinuatis pilosis utrinque aculeatis, calyce aculeato longitudine baccæ globosæ, floribus polygamis.

Solanum diffusum. *Hort. Beng.* 17?

Solanum ferox. *Burm. Fl. Ind.* 56. (excluso synonymo Rheedii.) *Willd. Sp. Pl.* i. 1039?

Gula Carnatice.

Habitat in Carnatæ ruderis.

Radix annua? *Caulis* lignosus, cubitum vel pedes duos altus, teres, ramosus, patulus, pilosus, lateri solari purpureus, aculeatus. *Folia* alterna, ad imam obliqua, ovata, sinuata, obtusa, pilosa, costata, venosa, utrinque aculeata, nervo centrali supra purpurascente. *Petiolus* teres, brevis, estipulaceus, aculeatus. *Aculei* validi, compressi, pilosi, in caule petiolo et pedunculo paulo recurvi, in calyce et foliis recti, in foliorum pagina inferiore virides, in aliis locis purpurei. *Pedunculi* intrafoliacei, aculeati, tomentosi, gemini; unus brevis florem unicum gerit hermaphroditum;

alter elongatus flores habet duos vel tres masculinos. *Calyx* quinquefidus laciniis ovatis, revolutis, petalo multum brevioribus. *Corolla* rotata, quinquepartita laciniis angustis subtrinerviis, extra pilosis, inter quas interpositæ sunt membranæ totidem, ore recto lacero, lacinias in corollam pentagonam conjungentes. *Stylus* masculinis brevissimus. *Baccæ* pendulæ, magnitudine grossulariæ globosæ, calyce omnino fere tectæ.

In Cheru Chunda flores fructiferi in eodem pedunculo plures. *Baccæ* minores, calyce multo majores.

CHUNDA, *p.* 69. *fig.* 37. written *Schunda* on the plate.

This, which the natives of Malabar consider as the prototype of the genus, and which therefore as usual in India has no specific name, is quite different from the species which the neighbouring people of Carnata view in the same light, and which has no prickles.

Plukenet (*Alm.* 350.) considered the *Schunda* as the same with the *Solanum spinosum fructu rotundo* of C. Bauhin, which is quoted for the *S. insanum* by Willdenow (*Sp. Pl.* i. 1038.); but this author quotes also for his *S. insanum* the *S. pomiferum magno fructu ex albo et atro-purpureo nitente, foliis et calyce spinosis* of Plukenet (*Alm.* 300. *Phyt. t.* 226. *f.* 3.), that Plukenet considered as the *S. pomiferum fructu nigro spinosum* of C. Bauhin. Which is right, I cannot take upon myself to say; but no great attention can be paid to the synonyma given by Willdenow; as for this very plant, which he defines "caule et calyce aculeatis," he quotes the *Trongum hortense* (*Herb. Amb.* v. 238. *t.* 85.), which has no prickles at all. It is true, that Plukenet considers as the same an African plant called *Tongu* by the people of Angola, *Macumba* by those of Congo, and *Belingela* by the Portuguese; but these latter in India gave this name to all

all the varieties of the *S. esculentum*: among these, however, we cannot include the *Chunda*, the fruit of which is not worth dressing.

The elder Burman continued to join the *Chunda* with the *S. spinosum fructu rotundo*, and applied them to the *Elabathu* of the Ceylonese, which with Hermann he called *S. Indicum spinosum, flore Borraginis, fructu croceo rotundo Persicæ magnitudine, Pomum de Hiericho dictum* (*Thes. Zeyl.* 219.). Linnæus having procured no specimen of this, left it among the class *Barbaræ* (*Fl. Zeyl.* 488.), and there it remained, until quoted by M. Lamarck for his *S. undatum* (*Enc. Meth.* iv. 301.). I have found this plant in the Gangetic provinces. Except in the size of the fruit it has the utmost affinity to the *S. Gula*, so that I shall only note the points in which it differs from the description which I have given of that plant.

Solanum undatum. *Enc. Meth.* iv. 301.
Solanum indicum spinosum, flore Borraginis, fructu croceo, rotundo Persicæ magnitudine, Pomum de Hiericho dictum. *Thes. Zeyl.* 219. *Lin. Fl. Zeyl.* 488.
Solanum spinosum fructu rotundo. *Pluk. Alm.* 350?
Chunda s. Schunda. *Hort. Mal.* ii. 69. t. 37.
Habitat in Magadhæ ruderis et hortis.

Pili in caule et foliorum pagina inferiore stellati, incani. *Folia* minus sinuata, superioribus acutis. *Bacca* magnitudine fere Juglandis, calyce multo major. *Pedunculus* fructiferus maxime incrassatus.

Near the villages of Gangetic India I have found a *Solanum* still more nearly related to the *Chunda* than the *Cheru Chunda* is, and called *Kanta Baigun* by the Bengalese. It seems to me to be the *S. zeylanicum* (*Enc. Meth.* iv. 295. *Sup.* iii. 742.), and at

first sight, being a large bushy shrub, is easily distinguished; but, on a closer examination, the structure of all the parts is so nearly alike, that I am not sure of their being different species. Specimens of both have been deposited in the Collection of the East India Company.

CATTU GASTURI, *p.* 71. *fig.* 38.

Commeline considers this as the same with a plant brought first to Europe from Egypt, where it is called *Ab el Mosch;* and in this he is probably right; but more doubt might have been entertained concerning the *Herba Moschata* of the West Indies, unless it had appeared that the plant was not a native of that country, but had been introduced from Africa (*Herb. Amb.* iv. 39.).

Plukenet, (*Alm.* 14.) however, without hesitation joins both the Egyptian and American plant to the *Cattu Gasturi*, under the name of *Alcæa Ægyptiaca villosa*, borrowed from C. Bauhin, adding to the list given by Commeline some more recent authorities.

Rumphius (*Herb. Amb.* iv. 38. *t.* 15.) as usual gives an excellent account of this plant under the name of *Granum moschatum*, and accounts for its appearance in America as above stated.

Bauhin's generic name *Alcea* had been changed by Tournefort into *Ketmia;* and the elder Burman, following his example, calls it *Ketmia Ægyptiaca, semine moschato* (*Thes. Zeyl.* 134.), mentioning that Ammannus considered the Egyptian kind as different from the Indian. If this supposition is well founded, no other person than Rheede and Rumphius has described the plant in question, all the synonyma quoted by Commeline, Plukenet, Rumphius, and Burman, belonging to the plant of Africa, or at least

least to the same transplanted to America. Burman, however, gives no notice of the circumstances that induced Ammannus to form this opinion.

Linnæus, changing the name *Ketmia* to *Hibiscus*, called this *H. foliis peltato-cordatis septemangularibus serratis hispidis* (*Fl. Zeyl.* 261), adding without comment synonyma of the Indian, Egyptian and American plants; but he does not mention Ammannus; nor was any change worth notice made in the *Species Plantarum*, nor by the younger Burman (*Fl. Ind.* 153.), except by introducing the specific name *Abelmoschus*, well derived from the Arabic.

M. Lamarck (*Enc. Meth.* iii. 359.) gives the synonyma a little fuller than even Linnæus in the *Flora Zeylanica;* but does not include that of Ammannus; and, although he quotes authors describing it as an African, Asiatic and American plant; yet, when treating of its native country, he omits the first altogether. Although he quotes the *Alcea Ægyptiaca villosa* of C. Bauhin, yet he does not refer to Plukenet's works under that head, where a reference to the *Cattu Gasturi* is made; but quotes him as describing the plant by two other names: 1. *Alcea moschata villosissima foliis in lacinias profundiores incisis* (*Alm.* 15. *Phyt. t.* 127. *f.* 1.) from Barbadoes. If this be a good representation of the West India plant introduced from Africa, I do not wonder at Ammannus having separated the Indian kind from it, as, however strongly the plants may resemble each other in qualities, they appear to me quite distinct species. 2. *Alcea Maderaspatana hastatis foliis glabris, pericarpio tantum villosa* (*Alm.* 15. *Phyt. t.* 127. *f.* 2.), which has still less resemblance than the West India plant to the *Cattu Gasturi*, and is quoted by Willdenow for the *Hibiscus hastatus* (*Sp. Pl.* iii. 808.).

Willdenow (*l. c.* 826.) and the *Hortus Kewensis* (iv. 220.) without at all quoting Plukenet, continue to call the *Abelmoschus* a native

a native of both Indies, omitting altogether Africa; so that the observation of Ammannus still remains to be cleared up; but I have no opportunity. Specimens of the *Cattu Gasturi* have been lodged in the Collection of the East India Company.

SCHORIGENAM, *p.* 73. *fig.* 39.

Although both Rheede and his annotator Commeline consider all the *Schorigenams* as *Urticæ;* yet this, the very prototype of the genus, belongs evidently to the order of *Euphorbiæ;* and it is therefore totally different as to genus from the plant of C. Bauhin, with which Commeline compares it.

Plukenet (*Alm.* 393.) was more fortunate in comparing it with a plant, which he calls *Urticæfolia Jamaicensis tricoccos*, and which probably belongs to the same genus.

The *Schorigenam* came afterwards to be described by several authors, all of which probably are carefully enough collected by the elder Burman under the title of *Ricinocarpos* (*Thes. Zeyl.* 202.), which includes, I think, three species: 1. the narrow-leaved *Kohabilia* of the Ceylonese, figured (*t.* 92.) under the name *Ricinocarpos zeylanica hirsuta, foliis lanceolatis serratis:* 2. the broad-leaved *Wælkahabilia* of the Ceylonese, which is the *Schorigenam;* and 3. the *Urtica racemosa urens fruticosa angustifolia, fructu tricocco*, which is probably the plant of Plukenet.

Linnæus (*Fl. Zeyl.* 340.) considered the *Kahabilia* and *Wælkahabilia* as the same plant, and as the same with the *Schorigenam* (*Schorigeram*, an error since pretty generally copied); but leaves out the American plant, and calls ours *Acalypha involucris fœmineis pentaphyllis pinnatifidis.* He says "facies hujus plantæ maxime variat;" and certainly no two plants of the same genus usually differ more than the *Kahabilia* and *Wælkahabilia*, as represented by Burman and Rheede. Linnæus probably considered them as of the same species, because the structure

ture of their involucrum was similar, and totally different from that of the other plants which he placed in the same genus. But this argument should have fallen to the ground, when he found that he had placed them wrong, and called them *Tragia involucrata* (*Burm. Fl. Ind.* 294.), quoting both the narrow and broad leaved kinds for the same species. The most essential difference between the two plants, and which might perhaps not be observable in dried specimens, is, that the *Schorigenam* seems to be an erect plant; for Rheede, speaking of the *Valli Schorigenam* (79.), says, "a prima (i. e. a *Schorigenam*) non differt nisi quod hic sit *Convolvulus:*" and again, "*Schorigenam* est frutex altitudine trium pedum." Now the scandent nature of Burman's narrow-leaved plant is apparent even in his drawing: and Willdenow (*Sp. Pl.* iv. 324.), having seen the plant alive, adds to the specific character "caule scandente." Although, therefore, he continues to quote the *Schorigenam* as well as Burman's plant, it seems clear that he meant the latter only, and should have quoted the *Valli Schorigenam* as synonymous, while the *Schorigenam* of Malabar or *Wælkahabilia* of Ceylon is a very distinct species.

Although M. Poiret places the *Tragia involucrata* among the species that have a climbing stem, yet he still continues (*Enc. Meth.* vii. 723.) to join with it the *Schorigenam;* but he alters the specific character of Willdenow, who has the *folia ovata* like the *Schorigenam*, in place of *sublanceolata* like the *Kahabilia*. The fact however is, that in the twining plant the leaves vary much in shape from ovate to nearly lanceolate, as Linnæus justly observed, which probably induced him to join the *Schorigenam* with the plant of Burman, having overlooked the erect stem of the former. Owing to this variable form in the leaves of the twining plant, the question is not, whether it is the same with the erect *Schorigenam;* but whether it be different from the

the *Tragia hispida* (*Willd. Sp. Pl.* iv. 323.); for the lower leaves of this latter are as much serrated as those of the *T. involucrata*, although the upper ones are not so, and such alone may have been on the specimens which Willdenow saw. The real difference between the *T. hispida* and *T. involucrata* is, that the leaves of the former are *cordata* and of the latter *ovata*. The former, it must be observed, is that which in the Botanical Garden near Calcutta, after the death of Dr. Roxburgh, I found, called *Tragia involucrata*.

In the *Hortus Kewensis* (v. 255.) neither Burman nor Linnæus is quoted, so that we can only judge of what plant is meant by the term *caule scandente* used in the specific character.

I have never seen the *Schorigenam;* but on comparing the *T. involucrata*, that is, Burman's plant, and the *T. hispida*, with the figure and description of Rheede, I have no doubt that, although different from the *Schorigenam* as a species, it belongs to the same genus; which is more than can be said for several of the *Tragias*, for instance the *Chamælea*.

Batti Schorigenam, *p.* 75. *fig.* 40.

Commeline considers this as a species of *Urtica* called *Pino*, and described as a Brasilian plant by Piso; but their identity is very doubtful, although so far as to their being both *Urticæ* seems entitled to some regard.

Plukenet thought that this *Schorigenam* might possibly be the same with his *Urticæ genus Indianum minime pungens* (*Alm.* 394.), or with his *Lupulo vulgari similis, Indiæ orientalis, floribus in spicam ex origine foliorum prodeuntem* (*Alm.* 229. *Phyt. t.* 201. *f.* 5.). The former cannot be the *Batti Schorigenam cujus folia adurentia;* but Plukenet's figure of the *Lupulo vulgari similis* &c. has so strong a resemblance to the figure of Rheede, that I should think them probably intended to represent the same plant, did not Plukenet's

Plukenet's specific character seem clearly to imply a twining plant, while the *Batti Schorigenam* is evidently erect, "frutex ex genere *Urticarum* altitudine trium pedum."

The elder Burman (*Thes. Zeyl.* 231. *t.* 110. *f.* 1.) without any discrimination quotes the *Batti Schorigenam*, both plants of Plukenet, and the *Pino* of Brazil, for his *Urtica pilulifera, foliis majoribus longissimis pediculis, minoribus brevibus pediculis donatis.* I have little doubt that so far as relates to the *Batti Schorigenam* he is right, his figure being good, and his description of the stem (*caulis bipedalis*) showing it to be an erect plant, and not a climber. With respect, however, to several of the other synonyma that he quotes, I am doubtful; his admission of the Brasilian *Pino* and of the plants of Plukenet rendering his accuracy suspicious. The Ceylonese name according to Burman is *Katschambali*; and if he is right in this, and quotes accurately the *Urtica racemosa, pilulifera tricoccos* of Hermann, then it is not an *Urtica*, but a *Tragia* or *Acalypha*.

Linnæus (*Fl. Zeyl.* 159.) leads us into greater difficulties, uniting the *Batti Schorigenam* not only with the *Lupulo vulgari similis* of Plukenet, and the *Pino* of Brazil; but with no less than three plants of the elder Burman, which I can see no reason for thinking the same with each other. In the first place he quotes the *Urtica fatua spicata, foliis floribusque petiolis longissimis donatis* (*Thes. Zeyl.* 232. *t.* 110. *f.* 2.), adding that the figure is good, that is to say, resembles the plant which he meant to describe: but this cannot be the *Batti Schorigenam*, the leaves of which sting, while those of the *Urtica fatua*, as the very name implies, are inert. It is however very probable, on this very account, that the *Urtica* (*Lin. Fl. Zeyl.* 159.) is the *Urticæ genus Indianum minime pungens* above mentioned, as being so like the *Batti Schorigenam* as to have been taken for it by Plukenet. But further, the leaves of the *Urtica fatua* &c. are cordate,

while those of the *Batti Schorigenam* are ovate and shaped like a wedge towards the footstalk. Neither does Linnæus quote for his plant the *Katschambali*, but the *Watuhahambilya*.

Now the *Watuhahambilya* is the second plant of Burman, quoted by Linnæus for the *Batti Schorigenam*, that I shall mention. By Hermann it is called *Urtica zeylanica, hortensis, urens, foliis cannabinis* (*Thes. Zeyl.* 233.). It is impossible that so good a botanist as Hermann would compare to the leaves of the *Cannabis*, either those of the *Batti Schorigenam* or of the *Urtica fatua* &c. of Burman; and I have little doubt that Hermann meant the plant now called *Tragia cannabina*; and this the more especially, that Hermann, besides this garden plant, describes another *Watuhahambilya*, which he calls *Cannabina indica, sylvestris, Urticæ foliis urentibus*. Now these two plants I take to be what Willdenow (*Sp. Pl.* iv. 326.) calls two varieties of the *Tragia cannabina*, represented by Plukenet (*Phyt. t.* 220. *f.* 2; and *t.* 120. *f.* 6.). These indeed have little or no resemblance to the *Croton hastatum* β of Burman (*Fl. Ind.* 305. *t.* 63. *f.* 1.), although this also is quoted for the *Tragia cannabina*; but Burman by mistake added the figure to the plant of Plukenet, which Linnæus no doubt meant (*foliis trilobo-hastatis lanceolatis dentatis*). Linnæus however was probably misled by Burman's figure into the mistake of supposing the stem erect; for a plant which I have no doubt is that of Plukenet, is certainly a climber. The *Croton hastatum* β is however the plant now called *Tragia cannabina* in the *Hortus Kewensis* (v. 256.), although I have no doubt that M. Lamarck is right in considering it as not a *Tragia*, but as a *Croton* very nearly allied to the *C. tinctorium*. Perhaps he rather erred in considering it as a mere variety of this European plant; and both Roxburgh and Koenig were probably right in thinking it a distinct species, which they called *C. asperum*; although Dr. Roxburgh afterwards

wards took it to be the *C. plicatum* (*Hort. Beng.* 69.), as I indeed did, until I found a different plant perfectly agreeing with the accounts of Willdenow, and with Burman's figure (*t.* 62. *f.* 1.), which represents the *C. tinctorium* γ of M. Lamarck. The erroneous quotation of this second plant of the elder Burman in Linnæus, may have arisen from Burman having erroneously transferred the Ceylonese name *Watuhahambilya* from his *Urtica fatua* &c. to his *Urtica zeylanica* &c.: and Linnæus, finding his *Urtica interrupta* in the collection of Hermann under the name *Watuhahambilya*, would quote for the *U. interrupta* Burman's *U. zeylanica* &c., while he was sensible that the figure of the *U. fatua* &c. represented his plant. This, however, is a mere conjecture.

We have thus freed the *Batti Schorigenam* from two of Burman's plants with which Linnæus confounded it. The third (*Thes. Zeyl. t.* 110. *f.* 1.), I have already said, I consider as the plant of Rheede; but as different from the *Urtica* of the *Flora Zeylanica*. It is true, that Burman in describing his *Urtica pilulifera* &c., which I consider as the *Batti Schorigenam*, calls the leaves *cordata*; but in looking at the figure, it is evident that he employed this term in a sense different from that adopted by Linnæus.

In the *Species Plantarum*, the *Urtica* of the *Flora Zeylanica* is called *U. interrupta*, which is adopted by the younger Burman (*Fl. Ind.* 297.). When he published the species, the synonyma had undergone some change. The *Urtica fatua* &c. of the elder Burman (by error written *U. sativa*) is joined with the *Lupulo vulgari similis* &c. of Plukenet, although it should probably have rather been joined with his *Urticæ genus Indianum* &c.; and these are the only plants quoted for the first variety of this species. It is true, that both fig. 1. and 2. in table 110 of Burman are quoted; but this also is a mere typographical error,

as fig. 1. is quoted for the next variety, in which the *Urtica pilulifera* &c. of Burman is rightly joined with the *Batti Schorigenam*, and with no other plant. So far is well, and the chief points remaining to be determined are, whether the inert *U. interrupta* α is to be considered as a mere variety of the stinging *U. interrupta* β, and whether one or both be really *Urticæ*. I have already mentioned a doubt on this last head, as one of the authors quoted by the elder Burman for his *Urtica pilulifera* &c. calls it *tricoccos*, which implies its not being an *Urtica* as defined by Linnæus.

M. Lamarck (*Enc. Meth.* iv. 643.) continues the *U. interrupta* much as it was in Burman's *Flora Indica*; but quotes all the four synonyma, without dividing them into two varieties or sets; only he quotes the *U. fatua* &c. with doubt. It is clear, however, that the specimens which he had, belonged to the *Batti Schorigenam*, as it had "feuilles point cordiformes—parsemées de poils piquans," and it is impossible to conceive that he would mistake one of the *Euphorbiæ* or *Tricoccæ* for an *Urtica*. That point may therefore be considered as settled; and the *Planta tricocca* of Hermann quoted by Burman, may be safely referred to some other place.

Willdenow (*Sp. Pl.* iv. 342.) calls the *U. interrupta* of Linnæus by the name of *Boehmeria interrupta*, leaving it still, however, in the natural order of *Urticæ*; but he throws the synonyma again into some of the confusion from which they had been freed in the *Flora Indica* of Burman. The *Batti Schorigenam* he indeed leaves with the *Urtica pilulifera* &c. of the elder Burman: but then he places these stinging hairy erect plants in his first variety of the *Boehmeria interrupta foliis glabris*, and along with them he includes the *Urtica* of the *Flora Zeylanica*, the leaves of which do not sting, and the *Lupulo vulgari similis* &c. of Plukenet, which is most probably a climber: but further, for his

his second variety of the *Bochmeria interrupta*, retaining the error (*sativa* for *fatua*) of the younger Burman, he quotes the *Urtica fatua* &c. of the elder Burman, although this is the very authority which Linnæus in the *Flora Zeylanica* recommended as giving a good representation of his *Urtica*, and which, as I have said, is probably the *Urticæ genus Indianum* &c. of Plukenet. Along with the first variety he introduces an *Urtica montana*, which I cannot trace in authors. It is true that he quotes Rumphius (*Amb.* vi. *p.* 48. *t.* 20. *f.* 1.); but the plant there described is the *Urtica Decumana*, which has no sort of affinity to the *Batti Schorigenam*; and the only other *Urtica* mentioned in the Index to the work of Rumphius is the *U. mortua* (*Herb. Amb.* vi. 49. *t* 20. *f.* 2.), which is equally different from the *Batti Schorigenam*, being probably the *Wellia Cupameni* (*Hort. Mal.* x. *t.* 63.), of which I shall again have occasion to speak.

On the whole, the only authorities which I can consider as certainly the same with the *Batti Schorigenam*, are the *Urtica pilulifera* &c. of the elder Burman, excluding many of the synonyma; the *Urtica interrupta* β of the younger Burman; and the *Urtica interrupta* of Lamarck; excluding altogether from his synonyma the first plant of Burman, and marking that of Plukenet with doubt.

Ana Schorigenam, *p.* 77. *fig.* 41.

The specific names *Ana* and *Hasty*, prefixed to the generic terms *Schorigenam* and *Gasurculi* of the natives, imply elephant.

Plukenet calls this *Urtica urens racemifera major* (*Alm.* 393.); but throws no light whatever on the history of the plant, which can be only known from the account of Rheede. M. Lamarck, however, (*Enc. Meth.* iv. 645.) quotes this name of Plukenet (without noticing Rheede) as being the same with the *Urtica heterophylla* of Vahl, and the *U. palmata* of Forskahl; but he had not

not seen the plant, which he says grows in Egypt, no doubt on the authority of Forskahl at least. The specific character given by Forskahl (*foliis palmatis, spicis fœmineis pinnato-ramosis*) by no means agrees with the *Ana Schorigenam*; nor does Rheede's account of this agree with the description annexed by M. Lamarck, who does not however state whether this was taken from Forskahl or Vahl.

Although, therefore, Willdenow expressly joins the *Ana Schorigenam* with the plant of Plukenet, Forskahl and Vahl, and says that it is a native of India and Arabia, I have some hesitation in considering Forskahl's plant as the same: but as I see no objection to Vahl's character, the *Ana Schorigenam* may be his *Urtica heterophylla*, although the *U. palmata* may have been erroneously quoted (*Willd. Sp. Pl.* iv. 362.). If, however, M. Lamarck took his description of the *U. heterophylla* from Vahl, I think that he did right in not quoting the *Ana Schorigenam*. I found this plant in Malabar, and sent the seed to Dr. Roxburgh, who reared it in the botanical garden near Calcutta, where it is called *U. heterophylla* (*Hort. Beng.* 67.). I regret that on the spot I took no description; but I gave a specimen to Sir J. E. Smith, which may serve to show whether or not it has been rightly conjoined with the plants of Vahl and Forskahl. At any rate, it is to be hoped that Dr. Roxburgh's account will be soon published.

Valli Schorigenam, *p.* 79. no *fig.*

In the commentary on the *Schorigenam*, I have endeavoured to show that the *Valli Schorigenam*, and not the *Schorigenam*, should have been quoted for the *Tragia involucrata*.

Schadida Calli, *p.* 81. *fig.* 42.

Calli is a genus similar to the *Euphorbium* of European botanists. Commeline considers the *Schadida Calli* as exactly the same

same plant with that which in the interior of Africa produces the gum called *Euphorbium*, and judges from fragments of the plant, flowers and seed-vessels mixed with the gum from Barbary, and compared with the *Schadida Calli*. If the fragments of the plant were large, such as a whole joint, there would be little room for error; but such fragments are not likely to have been mixed with a drug; and I doubt much, if any one from the flowers or capsule alone, of any species of *Euphorbium*, could positively say that it belonged to no other species, where there are so many nearly alike.

Plukenet (*Alm.* 370.) mentions Commeline's opinion, without either supporting or opposing it, and calls it *Tithymalus aizoides triangularis nodosus et spinosus lacte turgens acre*; but he considers it as a mere variety of a plant from the Canaries, with four or five sides to its stem, of which he gives a figure (*Phyt. t.* 320. *f.* 2.): but this identity is now abandoned, and the figure belongs to the *Euphorbia canariensis* (*Willd. Sp. Pl.* ii. 882.).

Commeline's opinion, however, seems to have been adopted by no less botanists than Tournefort and Ray, as appears from the elder Burman (*Thes. Zeyl.* 96.), who calls the plant *Euphorbium trigonum, spinosum, rotundifolium*, and gives the synonyma of preceding authors. He considers as a distinct species the *Sandra Calli* of the Ceylonese, for which he quotes the *Tithymalus* from Canary, described by Plukenet.

Linnæus also adopts the opinion of the *Schadida Calli* being the plant which produces the gum *Euphorbium*; and he considers the *Sandra Calli* as a mere variety, rejecting, however, the plant from Canary described by Plukenet; nor does he state (*Fl. Zeyl.* 199.) whether the gum is produced by the *Schadida* or *Sandra*.

On account of its being supposed to be the plant which produces the gum called by the ancients *Euphorbium*, this plant was now

now called *Euphorbia antiquorum*; nor did the younger Burman (*Fl. Ind.* 110.) nor Willdenow (*Sp. Pl.* ii. 881.) make any change in the synonyma. This supposition, however, rests solely, I believe, on the authority of Commeline, copied from one botanist to another, and taken up by him, I think, on inadequate proof: and it must be observed, that C. Bauhin, a better authority, considered the *Euphorbium* to be quite a different species, now called *Euphorbia officinarum*, which is a native of Africa. Even the most accurate botanists speak too loosely on such subjects: for instance, M. Lamarck, speaking of the juice of the *Schadida Calli* (*Enc. Meth.* ii. 413.), "Ce suc epaissi et desseché constitue la gomme-resine connue dans les boutiques sous le nom d'Euphorbe." I ask, who ever saw this done? He afterwards indeed justly remarks, that the juice of the *E. officinarum* is more commonly employed; and in describing the latter plant he says (*l. c.* 415.), "Il découle de sa tige, soit naturellement, soit par incision, un suc laiteux, qui s'épaissit à l'air, se condense, et se dessèche en petits morceaux friables d'une jaune pale, et qu'on apporte en Europe, où il est connu sous le nom d'Euphorbe." I ask again, who ever saw such a gum on the *Euphorbium antiquorum?* I have without success inquired for a gum produced by this tree, in various parts where it grew in abundance.

Ela Calli, *p.* 83. *fig.* 43.

Commeline only states, that this is a species of *Euphorbium* not previously described: but what shows the loose manner in which he wrote, he says "nullum est dubium, quin idem gummi cum priore producat;" although he admits that the gum of the former was unknown in the country where it grows: "videtur autem Malabaribus modus colligendi gummi esse incognitus."

Plukenet considered the *Ela Calli* as his *Tithymalus zeylanicus spinosus arborescens* (*Alm.* 369.), which had been described by Breynius

Breynius under the name of *Euphorbio et Tithymalo media affinis aizoides Indica arborescens spinosa Nerii folio:* but when he published the *Phytographia* (*t.* 230. *f.* 4.), he quoted the *Ela Calli* with doubt; for which perhaps there was reason, as we shall afterwards see. He also quoted, although with doubt, the *Tithymalus africanus arborescens spinosus et foliosus lactescens et Euphorbium fundens*, which is quite different from the *Ela Calli*, being the true *Euphorbium*, with which, however, the *Ela Calli* has been confounded by very able botanists.

The elder Burman (*Thes. Zeyl.* 95.) quotes the *Ela Calli* for his *Euphorbio-Tithymalus spinosus, caule rotundo, et anguloso, foliis Nerii latioribus, et angustioribus.* Here he includes two very distinct species, which he allows had been distinguished by Commeline, and by a writer in the *Mémoires de l'Académie des Sciences*; but "quas tantum varietates habeo, si vero quis distinctas velet species, per me licet." As these species are totally different, it is to be regretted that he did not refer the synonyma to each of his varieties separately, as, in the manner they now stand, they are useless; and it remains uncertain especially, to which we should refer the species mentioned by Plukenet and Breynius, as above stated. Burman, however, here acted with propriety, in so far as he put his reader on his guard.

Linnæus, without giving any direct notice as Burman had done, included both the angular- and round-stemmed plants in one species (*Fl. Zeyl.* 200.), leaving it utterly impossible to judge which he meant; only perhaps it may be inferred, from the term "angulis oblique tuberculatis" used in the specific character, that he meant the kind with the angular stem, which is not the *Ela Calli*, although this is quoted. By this time the plant described by Linnæus had become common in the gardens of Europe, and is probably that now common there.

In the *Species Plantarum* followed by the younger Burman

(*Fl. Ind.* 111.) the plant of the *Flora Zeylanica* with all the synonyma is called *Euphorbia neriifolia*; but a new quotation, the *Ligularia* of Rumphius (*Herb. Amb.* iv. 88. *t.* 40.), is introduced; and, being evidently the kind with an angular stem, is probably the one meant by Burman, as he continues the term "angulis oblique tuberculatis" in the specific character, and as the plant was common: yet what Rumphius says should have deterred Burman from quoting the *Ela Calli*; for mentioning the affinity of the *Ligularia* with the *Ela Calli*, Rumphius says, "hac in re autem parum differunt, quod Amboinensis truncus sit pentagonus et contortus instar fili."

M. Lamarck (*Enc. Meth.* ii. 415.), although he quotes both the *Ela Calli* and the *Ligularia*, evidently shows that he meant the latter, as he mentions that its branches have five angles; and this is the kind common still in the gardens of Europe. He had probably observed that there was a difference in appearance between the plants of Rheede and Rumphius, as he says, "Elle perd ses angles, et ses épines dans celles de ces parties qui ont vieilli:" but the extreme leafy branches of the *Ela Calli* are cylindrical, as appears from the figure.

Willdenow (*Sp. Pl.* ii. 885.) quotes both *Ligularia* and *Ela Calli*; but, although he hints at no difference, he continues probably to mean the former. The *Hortus Kewensis* (ii. 157.), in quoting neither one nor the other, leaves us still perhaps more in the dark concerning his meaning.

Although it would thus appear that the *Ligularia* has long been known in Europe, and was in fact the plant generally meant for the *Euphorbia neriifolia* since the time of Linnæus, yet it is by no means a common plant in the southern parts of India proper. Dr. Roxburgh, I know, had never noticed it twenty years ago; nor did I see it until I went to the north-east parts of Bengal in 1807. Previous to these times, Dr. Roxburgh and I had

had always considered the *Ela Calli* as the *E. neriifolia*; for it forms one of the most common hedges in India, and on that account the natives call it simply *Sij*, while they give specific names to the less common kinds. Thus the *Ligularia* is called *Pangch Sij* or Five-sided *Euphorbia* or *Mansa Sij*, because it is dedicated to Mansa, the deity presiding over serpents; and thus the *E. antiquorum* is called *Nara Sij*. Dr. Roxburgh, I believe, continued all his days to call (*Hort. Beng.* 36.) the *Ela Calli* by the name *E. neriifolia*, while he gave the name *E. Ligularia* to the plant so called by Rumphius, considering it a new species; although, as I have said before, it is pretty certainly the *E. neriifolia* of Linnæus and his successors. In order to avoid ambiguity, as the term *Neriifolia* has been employed for a species so ill-defined, it perhaps should be altogether abandoned; especially as it is not happily chosen for either species; and then, leaving the excellent name *Ligularia* with the species to which it has been given by Rumphius, and borrowing from the Brahmans of Malabar, we may take *Nivulia* for the *Ela Calli*; and thus we shall have the two species properly discriminated.

1. *Euphorbia Ligularia* (seminuda, aculeis stipularibus geminatis, angulis ramorum quinis spiralibus, foliis oblongis). *Hort. Beng.* 36.

   Euphorbia Neriifolia. *Hort. Kew.* ii. 157. *Willd. Sp. Pl.* ii. 885. *Enc. Meth.* ii. 415; et *Burm. Fl. Ind.* 111. exclus. var. syn.

   Ligularia. *Herb. Amb.* iv. 88. *t.* 40.

   Tithymalus aizoides, arborescens, spinosus, caule angulari Neriifolio *Commelini apud Burm. Thes. Zeyl.* 96.

   Euphorbium angulosum, foliis Nerii latioribus *Boerhaavii apud Burm. l. c.*

   Pangch Sij vel Mansa Sij Bengalensium.

   Habitat in sylvis et ad templa Bengalæ orientalis.

2. *Euphorbia Nivulia* ramis teretibus seminudis, spinis stipularibus geminatis spiralibus, foliis lingulatis mucronatis acute carinatis.

Euphorbia Nereifolia. *Hort. Beng.* 36.

Tithymalus arbor, Indica, spinosa, foliis latis, linguæ caninæ facie *Hermanni apud Burm. Thes. Zeyl.* 95.

Tithymalus aizoides, arborescens, spinosus, caudice rotundo Nerii folio *Commelini apud Burm. l. c.* 96.

Tithymalus zeylanicus spinosus arborescens. *Pluk. Alm.* 369?

Ela Calli. *Hort. Mal.* ii. 83. *t.* 43.

Sij Bengalensium.

Habitat ubique in Indiæ sepibus.

I should have been inclined to have considered this as the *Sudu Sudu Tikos* of Rumphius (*Herb. Amb.* iv. 88.), used much in the hedges of Bali; for, as the plant is very prickly, he is evidently wrong in taking it for the *Tiru Calli*; but, speaking of its branches, he says, "non erectos sed procumbentes et flagellosos," which is by no means applicable to the *Ela Calli*; and we must therefore consider this as a third species, nearly allied to the two former.

TIRU-CALLI, *p.* 85. *fig.* 44.

According to the notions prevalent at the time among botanists, Commeline would not admit this to be an *Euphorbium*; but further observations have justified the arrangement of the natives of Malabar. From the term *Portigalli Nivuli* given by the Brahmans, they probably considered it as an exotic introduced by Europeans; and, although it has spread wonderfully over the whole Indian peninsula, scarcely any plant being there more common, it is still rare in Gangetic India; and, when Rumphius wrote, seems to have been recently introduced into the

the Indian archipelago, and only reached Amboina in 1693 (*Herb. Amb.* vii. 62.).

Under the name *Tithymalus arborescens caule aphyllo* Plukenet (*Alm.* 368; *Phyt. t.* 319. *f.* 6.) not only gives a good representation of the *Tiru Calli*; but among the synonyma of preceding authors gives us some, which point out Africa as its proper native country: for he asserts, that it is the *Planta lactaria*, *Xabra*, and *Camorronum* of Rhasis and Rauwolf, the *Felfel Tavil* s. *Piper longum Ægyptium* of Veslingius, and the *Tithymalus aphyllus Planta Mauritanica* of Imperatus.

The elder Burman (*Thes. Zeyl.* 223.) adds nothing to our knowledge of the plant described by Plukenet (which he calls *Tithymalus ramosissimus*, *frutescens*, *pene aphyllos*), except some synonyma of authors subsequent to Plukenet: but he rejects every name that hinted its being a native of Africa. All these he joins with his *Tithymalus orientalis*, *articulatus*, *Juncus aphyllos* of Hermann, which he considers as a distinct species, called *Muwakirya* by the Ceylonese, although the text has *Munakirya*; but, as appears from the index, this is an error.

Linnæus joined the two species of Burman into one (*Fl. Zeyl.* 196.), omitting altogether the names referring to Africa: but whether he thought that the accounts were too imperfect to merit quotation, or that the African plant was not the *Tiru Calli*, I cannot say: from this time forward, however, India is considered as the only native country of the *Tiru Calli*.

In the commentary on the *Ela Calli* I have mentioned the error of Rumphius (*Herb. Amb.* iv. 88.) in considering the *Tiru Calli* as the same with the *Sudu Sudu Tikos*, a plant with strong prickles: but he afterwards gave an excellent account of the *Tiru Calli* under the name of *Ossifraga lactea* (*Herb. Amb.* vii. 62. *t.* 29.).

In the *Species Plantarum*, followed by the younger Burman (*Fl.*

(*Fl. Ind.* 111.), the plant of the *Flora Zeylanica*, with the addition of the *Ossifraga lactea*, becomes the *Euphorbia Tirucalli*, with a termination rather barbarous.

M. Lamarck (*Enc. Meth.* ii. 418.), without adding Africa to its native habitation, restores the Egyptian *Telfel-Tavil* to the synonyma; but this is again omitted by Willdenow (*Sp. Pl.* ii. 890.).

BAHEL SCHULLI, *p.* 87. *fig.* 45.

The Malabar genus *Schulli* implies plants of the natural order of *Acanthaceæ*, prickly in some of their parts, and having erect woody stems and stiff leaves; and these circumstances make the arrangement natural, although the plants belong to different Linnæan genera. Commeline's comparison of the *Bahel Schulli* with the *Genista* is an attempt at classification more rude than that of the natives.

The only author, since the time of Commeline, who notices this plant, is M. Lamarck (*Enc. Meth.* i. 379.), who considers it justly as the *Barleria longifolia* of Linnæus, a species originally founded in the *Amœnitates Academicæ* from the *Anchusa angustifolia verticillis longis aculeis armatis* (*Pluk. Alm.* 30; *Phyt. t.* 133. *f.* 4.), and for which no authority, except Plukenet, is ever quoted by the Linnæan school. I have no doubt that the quotation in M. Lamarck is right; but I doubt much of the plant being a *Barleria*; and its leaves are by no means ensiform as Linnæus and M. Lamarck assert. It was perhaps owing to its differing so much from the generic character of *Barleria*, and from the specific character given by Linnæus, while the *Bahel Schulli* was not quoted by any author which he consulted, that Dr. Roxburgh never introduced this plant into the catalogue of the botanical garden at Calcutta, although it grows abundantly there. He knew that it was the *Bahel Schulli*, he found that this was not quoted, and it is so very common, that he thought it must

must be described, yet he did not know by what name it was called. Such was nearly the dilemma in which at one time he told me he was placed.

In its habit this plant has no resemblance to any *Barleria* that I know; but it strongly resembles the *Acanthus ilicifolius*, one of the genus *Schulli*. Its flower, however, differs much from both, as will be seen from the following note.

Bahel Schulli.
Habitat in totius Indiæ aquosis vulgatissima.

Caulis erectus, rigidus. *Folia* linearia, sessilia. *Flores* in singulis verticillis plures; singuli foliolo lanceolato bracteati; universi bracteis spiniformibus 6 vel 8 cincti. *Calyx* teres quadrifidus, laciniis lateralibus parvis, summa majore, ima bifida. *Corolla* tubulosa, bilabiata. *Limbus* bipartitus; labio superiore apice bilobo, inferiore trilobo. *Stamina* didynama. *Filamenta* duo dimidio breviora. *Antheræ* subæquales.

Rheede mentions a *Bahel Schulli* with a white flower, which I consider as a mere variety, the change from blue to white not being unusual even among uncultivated plants.

Nir Schulli, *p.* 89. *fig.* 46.

The specific name implies water, and is probably meant to distinguish it from the following species, although the two other species of *Schulli* also grow in water. Commeline is exceedingly unlucky in comparing it to a *Teucrium*.

Plukenet imagined that he had received from Coromandel a plant resembling the *Nir Schulli*, which he called *Gratiolæ affinis Indiæ orientalis digitalis æmula* (*Alm.* 264. errore typographi 254.); but I cannot say that the figure which he gives (*Phyt. t.* 49. *f.* 3.) seems to me at all like the *Nir Schulli:* and it must be considered

sidered as representing three plants; that is, there are three plants very like each other; but they differ so much in the essential point of seed, that they must be three distinct species; and unfortunately, Plukenet neglects to inform us to which of the seeds the branch represented belongs; only as these marked *a* are placed near the capsules annexed to the branch, they probably belong to it, the seeds *b* and *c* having separate capsules placed by them. Plukenet himself afterwards (*Mant.* 90.) compares his plant with his *Gratiolæ affinis Maderaspatana, Digitalis æmula, folio Chinopodii, capsulis in verticillis positis* (*Alm.* 180.; *Phyt. t.* 193. *f.* 3.): but this also has little resemblance to the *Nir Schulli*, and cannot even belong to the same genus, having the corolla divided into four equal segments. There is no representation of the flower in *t.* 49. *f.* 3.; but the capsules *a* and *b* strongly resemble those of the *Nir Schulli*, and these plants may belong to the same genus at least.

No further notice seems to have been taken of the *Nir Schulli*, until Willdenow thought (*Sp. Pl.* iii. 374.) that it might be a variety of the *Ruellia difformis*, first described by the younger Linnæus. This is saying very little; nor does M. Poiret say more (*Enc. Meth.* vi. 348.). I do not therefore wonder that Dr. Roxburgh described the plant as a new species, which he called *Ruellia obovata* (*Hort. Beng.* 46.); for it by no means agrees with what Linnæus states of his *Ruellia difformis*. Roxburgh, however, does not quote the *Nir Schulli*, because he found it already taken up. I doubt very much the propriety of considering this as a *Ruellia*, and think that it should be associated with the *Hygrophila* of Brown (*Nov. Hol.* i. 479.). The specimens, however, which I have presented to the Collection of the East India Company are marked *Ruellia? obovata*, while those of a species very nearly allied are marked *Ruellia? quadrivalvis*. As I look upon this last as entirely new, I shall give a full

full description of it, contenting myself with noticing the few points in which the *Nir Schulli* differs.

1. *Ruellia?* vel *Hygrophila quadrivalvis.*
Habitat in Mithilæ hortis mangiferis.

Radix perennis, lignosa, ramosa. *Caulis* lignosus, tres pedes altus, ramosissimus, diffusus. *Rami* glabri, tetragoni; laterum duobus convexis, duobus concavis, internodiis medio attenuatis. *Folia* opposita, apice obtusa, basi in petiolum decurrente acuta, costis supra depressis rugosa, venosa, utrinque hispida, inferiora oblonga, superiora subrotunda. *Petiolus* brevis, annulo ciliato amplexicaulis, pilosus, concavus. *Flores* in verticillis integris multifloris congesti, tubo et labio superiore albidis rubri, nunc omnino sessiles, tunc in capitulum pedicellatum axillare elevati. *Bracteæ* ad singulos verticillos communes circiter octo, foliaceæ, patentes, oblongæ, ciliatæ, calycem fere æquantes. *Calyx* glaber, cylindricus, paulo incurvus, ad medium fere quinquefidus laciniis linearibus erectis. *Corolla* ringens, pubescens; tubus longitudine calycis tenuis; fauces inflatæ; labium superius erectum, concavum, apice bifidum lobis emarginatis; inferius reflexum, subtus lacunosum, trifidum laciniis subæqualibus. *Filamenta* didynama. *Antheræ* sagittatæ, subæquales, biloculares loculis longitudinalibus, basi divaricatis. *Germen* superum. *Stylus* filiformis. *Stigma* simplex, incurvum. *Capsula* quadrangularis, obtusiuscula, glabra, bilocularis, bivalvis. *Valvulæ* medio septiferæ, apice dehiscentes, longitudinaliter per septa bipartibiles. *Semina* plura, plana, retinaculis suspensa; immatura dentata, denticulis maturitate evanescentibus.

2. *Ruellia?* vel *Hygrophila obovata.* Hort. Beng. 46.
Ruellia difformis. *Willd. Sp. Pl.* iii. 374? *Enc. Meth.* vi. 348?
Nir Schulli. *Hort. Mal.* ii. 89. *t.* 46.
Habitat in Tripura australe.

Flores albidi labio inferiore purpureo. *Calyx* pubescens, ciliatus. *Antherarum* loculi paralleli lineares. *Semina* etiam immatura integra.

"*Capsulæ* rotundæ, superne aculeatæ ac pungentes instar spinarum, in longum sex striis sulcatæ." *H. M.*

Cara Schulli, *p.* 91. *fig.* 47.

In comparing this to a *Capparis*, Commeline is no less unfortunate than with the two preceding species of *Schulli*; yet Plukenet followed him, calling it *Capparis forma, frutex spinosus malabaricus* (*Alm.* 80.). This accordingly led the elder Burman into the gross error of quoting the *Cara Schulli* for his *Capparis spinosa foliis oblongis* (*Thes. Zeyl.* 53.), which is not however the plant which Plukenet considered the same with the *Cara Schulli*, but the *Capparis indica spinosa angustiore salicis folio* (*Mant.* 36.), and this is the *Capparis zeylanica* of Linnæus (*Fl. Zeyl.* 210.).

Linnæus therefore in the *Flora Zeylanica* does not at all quote the *Cara Schulli*. In the *Species Plantarum* he afterwards joined it with an American plant, *spinis axillaribus solitariis oppositis*, to form the *Barleria buxifolia*, which is accordingly said to belong to both the Indies (*Willd. Sp. Pl.* iii. 377.). M. Lamarck indeed quotes the *Cara Schulli* for the *Barleria buxifolia* (*Enc. Meth.* i. 380.), and makes no mention of this plant growing in the West Indies; but Linnæus, from the nature of the specific character, probably saw only the West Indian plant; and M. Lamarck himself, in the very same page, refers the *Cara Schulli* to the

Barleria

Barleria cristata β, which both he and M. Poiret (*Enc. Meth. Sup.* i. 589.) confess should be considered as a distinct species.

I judge that the specific character of Linnæus does not belong to the *Cara Schulli*, but to the West Indian *B. buxifolia*, on account of the words respecting the spines already quoted; for although in some parts of Rheede's figure they are represented as solitary at each leaf, and of course opposite, yet in other parts they are represented as growing by pairs from the same point, as is usual in the genus *Barleria*, where the spines are in fact bracteæ. That this is really the case in the *Cara Schulli*, although the figure represents it ill, I infer from the description: "Spinæ binæ et binæ prodeunt. *Folia* in nodis infra ad exortum spinarum proveniunt. *Flores* supra ex origine foliorum e medio duarum spinarum petiolis brevissimis proveniunt." Now, converted into Linnæan language, I consider this to mean: *Folia* opposita. *Pedunculus* axillaris brevissimus uniflorus bracteis duabus spiniformibus munitus. That no dependence can be placed on the accuracy of the figure is clear, from its representing many of the spines placed below the leaves; while in the description the leaves are expressly said to be placed below and the spines above. The real *B. buxifolia* of Linnæus is therefore a West Indian plant.

I think that in Mysore I found the *B. cristata* β of M. Lamarck, and gave specimens, a description, and drawing to Sir J. E. Smith under the name of *B. obovata*. I think it quite different from both the *B. cristata* of Lamarck and that of Linnæus, for these are not the same; but, notwithstanding the difficulties mentioned by M. Lamarck, I think it the *Cara Schulli*. The following description will enable others to judge.

Barleria obovata bracteis spiniformibus simplicissimis, floribus solitariis alternis, calyce spinulis denticulato, foliis obovatis.

Barleria buxifolia. *Hort. Beng.* 45. *Hort. Kew.* iii. 59?
Barleria cristata β. *Enc. Meth.* i. 380. *Ill. Gen. t.* 549. *f.* 2.
Capparis forma, frutex spinosus malabaricus. *Pluk. Alm.* 80.
Cara Schulli. *Hort. Mal.* ii. 91. *t.* 47.
Habitat in Malyalæ sterilibus saxosis.

Frutex diffusus, ramosissimus. *Rami* pilosi, tetragoni, laterum duobus convexis, duobus concavis. *Folia* opposita, subsessilia, obovata, spina brevissima mucronata, integerrima, supra scabra, subtus ad marginem præsertim pilosa, venosa, internodiis longiora, stipulis nuda. *Flores* axillares, alterni, erecti, folio triplo longiores, nunc sessiles, tunc pedicellati, ad imam spinis duabus semiteretibus validis pilosis divaricatis indivisis bracteati, cærulei. *Calycis* quadripartiti laciniæ duæ exteriores plano-parallelæ, subæquales, ellipticæ, venosæ, spinoso-dentatæ; interiores lanceolatæ, parvæ, integerrimæ. *Corollæ* tubus teres, incurvus, calyce duplo longior: limbus patens, quinquepartitus laciniis obtusis, oblongis, subæqualibus. *Filamenta* e tubi medio quinque subulata, quorum tria minima (unde Rheedii oculos effugerint) antheris sterilibus, inclusis; duo limbo paulo breviora antheris fertilibus oblongis incumbentibus bifidis. *Germen* superum. *Stylus* filiformis longitudine staminum fertilium. *Stigma* acutum, aduncum.

In campis Cheræ sterilibus planta vix specie diversa flores habet albos, calycis foliola exteriora subcordata, cætera omnia simillima.

M. Lamarck objects to this being the *Cara Schulli* on account of the short spines at the end of the leaves, which are not represented in some of the leaves figured by Rheede, and are not mentioned in the description; but they are so small as not to have attracted the notice of the botanists of former days; and they are more

more clearly represented in some leaves of Rheede's figure, than they are in any one of the figure given by M. Lamarck. This botanist also objects, that Rheede describes the leaves of the calyx as entire on the edges, and in the figure they are certainly so represented; but I have already pointed out how faulty this is; and in the description we have as follows: "*Calyx*—constat quatuor foliis, duobus grandiusculis—exterius ex origine costulis, quæ in oris apicibus raris minutis—eminent—striatis."

That this is totally different from the *B. cristata* of both M. Lamarck and Linnæus will appear from the following accounts.

The former I found in the south of India, and gave specimens, a drawing and description to Sir J. E. Smith under the name of

Barleria ramosa bracteis spiniformibus multifidis, floribus axillaribus solitariis, calycis pilosi foliolo superiore spinoso-dentato.

Barleria cristata. *Enc. Meth.* i. 380. (exclusis synonymis.) *Ill. Gen. t.* 549. *f.* 1.

Habitat in Cheræ locis siccis duris.

Frutex cubitum altus, diffusus, ramosissimus. *Rami* teretes, pilosi, alterni, annulo ad folia cincti. *Folia* opposita, subsessilia, cuneiformia vel elliptica, integerrima, mucronata, setis in pagina præsertim inferiore aspersa, stipulis nuda. *Flores* albi, summo mane decidui, axillares, sessiles, solitarii, alterni, folio triplo longiores, erecti, ad basin utrinque bracteati spina patente valida multifida. *Calycis* quadripartiti, foliola duo exteriora, parallela, nervosa, ovata, mucronata, superiore latiore spinoso-denticulato, inferiore integerrimo: duo interiora parva, erecta, lanceolata, concava. *Corollæ* tubus medio angustatus, incurvus, pilosus. *Limbus* brevissimus, quinquepartitus laciniis ovalibus, quarum duæ paulo minores.

minores. *Filamenta* e medio tubi quatuor subulata, quorum duo brevissima antheris sterilibus, duo longiora antheris bifidis, inclusis. *Germen* ovatum. *Stylus* filiformis longitudine staminum majorum. *Stigma* incrassatum, oblique truncatum. *Capsula* longitudine calycis compressa, bivalvis. *Valvulæ* naviculares, medio septiferæ. *Semina* in singulis loculis duo, septo adnato insidentia, retinaculis subtensa.

The *B. cristata* of Linnæus is a larger, less rigid shrub, with leafy bracts, and is cultivated in the gardens of Gangetic India as an ornamental flower, and called *Jhungti*. As in most cultivated plants, a considerable number of varieties have arisen; nor have I been able to discover any specific character, on which I could depend to distinguish this *B. cristata* (*Hort. Beng.* 45.) from Dr. Roxburgh's *B. dichotoma*; so that I suspect both may belong to the same species, exceedingly different from the *Cara Schulli*, but differing very little from Dr. Roxburgh's *Barleria cærulea*, which may be the uncultivated plant; and this again is scarcely sufficiently distinct from a shrub called *Nundhekuja*, which I found on the lowest part of the Himalya mountains near the Gandaki river. Specimens of all these have been presented to the East India Company's Collection; and they are all easily distinguished from the *Cara Schulli* by wanting spines.

In the south of India, however, I found another species of *Barleria*, much more allied to the *Cara Schulli* than these plants of Gangetic India, and which it may require some care to distinguish. I gave specimens and a drawing to Sir J. E. Smith, under the name of *Barleria rubra*, and shall here give a description.

Barleria rubra bracteis spiniformibus simplicissimis, floribus axillaribus solitariis alternis, calyce integerrimo, foliis pilosis.
Habitat in Carnatæ campis sterilibus.

Frutex

Frutex pedes duos altus, diffusus, ramosissimus. *Rami* alterni, pilosi, tetragoni, laterum duobus concavis, duobus striatis. *Folia* opposita, subsessilia, ovalia, integerrima, spina mucronata, supra scabra, subtus pilosa, internodiis breviora, stipulis nuda. *Flores* axillares, alterni, solitarii, folio multoties longiores, nunc sessiles, tunc pedunculo brevi insidentes, rubri, ad basin bracteati spinis duabus rectis divergentibus pilosis. *Calycis* quadripartiti laciniæ duæ exteriores ellipticæ, venosæ, integerrimæ; interiores minimæ. *Corollæ* tubus calyce multo longior, rectiusculus: *limbus* patens, subæqualis, quinquepartitus, laciniis quatuor obovatis, quinta acuta minore. *Filamenta* e tubi medio quinque, quorum tria brevissima antheris sterilibus; duo elongata antheris incumbentibus, sagittatis. *Germen* ovatum, superum. *Stylus* filiformis, staminibus longior. *Stigma* acutum, aduncum. *Capsula* elliptica, tetragona, compressa, calyce longior, bivalvis. *Valvulæ* naviculares, medio septiferæ. *Semina* solitaria, villosa, compressa.

PAINA SCHULLI, *p.* 93. *f.* 48.

Commeline compares this to the *Ruscus sylvestris*, an old name for what is now called *Ilex aquifolium*; and the resemblance is so striking, especially in the living plant, that I do not wonder at Plukenet calling it *Aquifolia facie arbor malabarica, Acanthii flore albo cucullato* (*Alm.* 38.; *Phyt. t.* 261. *f.* 4.); and although it is not a tree but a small bush, and the flowers, so far as I have seen, are always blue, as Rheede describes, yet there can be no doubt of the plant's being the same; and Plukenet's comparison of its form to the *Acanthus* is quite correct.

Although not so fortunately classed as by Plukenet, there can be no doubt also, that the *Paina Schulli* is the *Eryngium indicum, aquaticum*,

aquaticum, Ilicis aculeatæ folio, floribus cæruleis of the elder Burman (*Thes. Zeyl.* 94.), the *Mahalkiri* of the Ceylonese, under which name it is mentioned by Linnæus (*Fl. Zeyl.* 638.), who conjectured that it might be the *Paina Schulli*. It is admitted by both, that the plant had previously been described by Bontius under the name of *Myracanthum seu Eryngium indicum*.

Rumphius (*Herb. Amb.* vi. 163.), although he does not quote Rheede, described shortly the *Paina Schulli* by the name of *Aquifolium indicum mas*; but most of what he says in the chapter belongs to another plant called *Aquifolium indicum femina*, of which he gives a figure (*t.* 71. *f.* 1.). Yet, on the establishment of the species called *Acanthus ilicifolius* by Linnæus, this figure is quoted as if it belonged to the same species with the *Paina Schulli*, and *Aquifoliæ facie arbor* &c. of Plukenet (*Burm. Fl. Ind.* 138.); nor have I it in my power to say which plant Linnæus meant.

M. Lamarck, perceiving this error, goes into the contrary extreme, and does not quote Rumphius at all; although, as I have said, he no doubt described the *Paina Schulli*. By this omission, however, of the figure given by Rumphius, we know that the *Paina Schulli* is the plant meant by M. Lamarck. Ray had called this plant *Frutex indicus spinosus, foliis Agrifolii, siliqua geminata brevi*; and, after quoting this, Linnæus had added the plate and figure in the *Phytographia* of Plukenet, where it is represented without a name; for it would appear, that Plukenet's account of the plant in the *Almagestum* always escaped the notice of Linnæus. By an error very unusual with M. Lamarck, he omits altogether to mention Ray; but quotes Plukenet's figure under the name which Ray had given to the plant.

CARAMBU,

CARAMBU, *p.* 95. *fig.* 49.

Commeline gratuitously annexes the word *Maram*, or tree, to the generic word *Carambu*, which is a herb from $1\frac{1}{2}$ to 2 feet high; and is no where mentioned by Rheede as being applied to the *Carambu*. On the strength of this word, however, joined to the plant having a fruit shaped externally like a clove, he considers it as a species of *Caryophyllus* or Clove-tree; for his words will not admit of our supposing that he meant the herbaceous *Caryophyllus*, which would have been a rather more fortunate conjecture.

Plukenet, adhering still somewhat to the resemblance to the clove, which is indeed striking, but seeing the absurdity of comparing a low, insipid, annual plant with an aromatic tree, calls it after Hermann, *Lysimachia indica non papposa, flore luteo minimo, siliquis Caryophyllum aromaticum æmulantibus* (*Alm.* 235.).

I think it probable, although he no where quotes the *Carambu*, that the elder Burman mentioned it by the name of *Lysimachia indica, aquatica, glabra, flore flavo, siliqua angulosa, stellata* (*Thes. Zeyl.* 146.), which is mentioned by Linnæus (*Fl. Zeyl.* 498.) by the name of *Dyanilla*.

Linnæus in the *Flora Zeylanica* (66.) quotes the *Carambu* for his *Ludwigia*; and, from the description which he gives, he no doubt saw the plant of Rheede: but then he considers the *Dyanilla* as different, and says that his *Ludwigia* is the *Kikirinda* of the Ceylonese, which Burman called *Lysimachiæ species fructu caryophylloideo* (*Thes. Zeyl.* 146.), and considered as the *Nir Carambu* of the *Hortus Malabaricus*, which is a *Jussieua*; and all the other synonyma quoted by Burman, right or wrong, point to the latter genus. Whether or not any transfer of names in Hermann's collection had taken place in the interval between Burman's inspection and that of Linnæus, I cannot say; but it

is evident, that the quotation from Burman should be excluded from the *Ludwigia* of the *Flora Zeylanica*.

This *Ludwigia* of the *Flora Zeylanica* in the *Flora Indica* (37.) of the younger Burman, together with the *Carambu*, both of which have alternate leaves and four petals, and the plant of the elder Burman, which has five petals, became the *Ludwigia perennis foliis oppositis*! and, what is still worse, the same *Carambu* and plant of Burman, with the plant of Hermann, quoted as above mentioned by Plukenet, which is no doubt the *Carambu*, is quoted for the *Jussieua suffruticosa*, while it is an annual plant! Such inaccuracies, copied probably from the first edition of the *Species Plantarum*, increase very much the suspicion, that it was Linnæus, and not the elder Burman, that had fallen into the error respecting the *Kikirinda* and *Dyanilla*.

Willdenow (*Sp. Pl.* ii. 577.), perceiving the error of quoting the *Carambu* for two plants, gives it to the *Jussieua suffruticosa*, although I strongly suspect, that for this he ought to have quoted the *Cattu Carambu*, next to be noticed, and which the younger Burman called *Jussieua suffruticosa* β (*Fl. Ind.* 103.), which has 4 petals and 8 stamina. Willdenow's meaning, however, concerning the *Jussieua suffruticosa* is very difficult to ascertain, as he quotes for it *Rumph. Amb.* 6. *t.* 41., in which three plants are represented, one being the *Lycopodium Phlegmaria*, and the other two seem to be *Orchideæ*. The *Ludwigia* of the *Flora Zeylanica*, which has alternate leaves, and which, from the description, is certainly the *Carambu*, Willdenow calls *Ludwigia oppositifolia*, by which he no doubt means the *L. perennis* of Linnæus and Burman.

M. Lamarck quotes the *Carambu*, and the plant of Hermann, cited by Plukenet as above mentioned, and no doubt the same with the *Carambu*, for his *Jussiæa caryophyllæa* (*Enc. Meth.* iii. 331.). He probably was unable in his dried specimen to observe the

the number of stamina. He adds as a variety the *Lysimachia non papposa humilis Maderaspatana, Clinopodii lutei foliis non crenatis, fructu caryophylloideo parvo* of Plukenet, (*Alm.* 236. *Phyt. t.* 203. *f.* 5.), which is no doubt remarkably like the *Carambu*; but I think Plukenet was too correct to describe one plant by two names on the same sheet of paper; and I therefore suppose this to be the *Lysimachiæ species fructu caryophylloideo* of the elder Burman, having five petals, that has often been confounded with the *Carambu*. In this case the name *Jussiæa caryophyllæa* should be confined to this variety, as it belongs to this genus; while the *Carambu* or *Jussiæa caryophyllæa* α is a *Ludwigia*, which I would call

Ludwigia diffusa caule diffuso, foliis lanceolatis, capsulis subpedunculatis folio dimidio brevioribus.

Habitat in Indiæ ultra et citra Gangem aquosis.

Radix fibrosa, annua. *Caulis* herbaceus, solidus, geniculis inferioribus radicans, linea elevata e petiolorum basi utrinque decurrente angulatus, glaber, ramis sparsis diffusus. *Folia* caulina alterna, lanceolata, integerrima, acuta, glabra, venis simplicibus instructa, plana: in ramulis floriferis folia conferta, sæpe opposita. *Petiolus* brevissimus, semiteres, glaber, basi rudimentis foliorum prodeuntium appendiculatus, stipulis nudus. *Flores* subsessiles, axillares, solitarii, folio multo breviores, flavi, nudi. *Calyx* superus, persistens, quadripartitus laciniis ovatis, acuminatis patentibus. *Petala* quatuor, calyce breviora, oblonga, concava, patentia, æqualia. *Filamenta* quatuor erecta, subulata, brevia. *Antheræ* magnæ, bisulcæ, ovales, erectæ. *Germen* tetragonum, calyce longius. *Stylus* teres, longitudine staminum. *Stigma* magnum, globosum. *Capsula?* tetragona, prismatica, obtusangula, calyce reflexo breviori coronata, apice quadri-

punctato truncata, quadrilocularis, ad latera indeterminate dehiscens, septis e medio laterum receptaculi centralis quadrangularis prodeuntibus. *Semina* plurima, parva, angulis receptaculi insidentia, conferta.

Under the name of *Ludwigia perennis*, no doubt given to it by Linnæus, I sent specimens of this plant from Ava, which were given to Sir Joseph Banks; and I have since presented others to the Collection of the East India Company, by the name of *Ludwigia diffusa*, for the name *perennis* can scarcely be continued to an annual plant. Whether or not Dr. Roxburgh meant to describe it under the name of *L. parviflora*, I cannot say. He quotes no synonyma (*Fl. Ind.* i. 440.); and some points of his description differ from mine; yet in most circumstances they agree, and a plant so common should have been known to him. That he meant this plant, is more probable from the native name *Bem Lubunga*, which is annexed to it in the *Hortus Bengalensis* (11.); for this name signifies the Wild Clove, from the very obvious similitude of its fruit.

CATTU CARAMBU, *p.* 97. *fig.* 50.

This plant is no doubt very nearly allied to the former; but the resemblance of its fruit to the clove is less striking than in the *Carambu*, so that Commeline is still less happy in calling it a *Caryophyllus*.

Linnæus (*Fl. Zeyl.* 170.) joined this with an American plant, which he called *Jussiæa erecta floribus tetrapetalis octandris sessilibus*, and which had become common in European gardens; but the name is now confined to the American plant, from which the *Cattu Carambu* is acknowledged to be different.

The younger Burman (*Fl. Ind.* 103.) quotes the *Cattu Carambu* for his *Jussiæa suffruticosa* β, although it would appear that the plant

plant which he meant, and which he had received from Java, had opposite leaves. Very little dependence can therefore be placed on this authority; but from the description annexed by Willdenow to his *Jussieua suffruticosa*, taken probably from the *Species Plantarum* of Linnæus, I have little doubt that the *Cattu Carambu* was the plant really meant: in which case the synonyma of Rumphius, Hermann, Rheede and Ray, given by Willdenow (*Sp. Pl.* ii. 577.) must be removed, and in their stead the *Cattu Carambu* introduced; for it is no where, that I can find, mentioned by Willdenow.

The only reference, therefore, that I can make with certainty to a systematic writer for the *Cattu Carambu*, is to the *Jussiæa villosa* of M. Lamarck (*Enc. Meth.* iii. 331.). This name should be retained, even should it be admitted, as is probable, that this was the plant actually described by Linnæus under the name of *J. suffruticosa*; for the term *suffrutex* is in no manner applicable to the *Cattu Carambu*; and the synonyma in Linnæus are so erroneously quoted, that in order to prevent confusion his name should be altogether abandoned, especially as it has been applied by Gærtner (*De Sem.* i. 159.) to a very different species.

This *Cattu Carambu* is the plant which Dr. Roxburgh called *Jussieua exaltata* (*Hort. Beng.* 33.); and its Sanscrit name *Bhoo Luvunga* implies Earth Clove, the similitude between its fruit and that of the Clove being still perceptible.

Nir Carambu, *p.* 99. *fig.* 51.

Commeline does not venture to conjecture concerning this plant, although its affinity to the preceding is evident; but its fruit did not mislead by so strong a resemblance to the Clove.

The *Nir Carambu* was annexed by the elder Burman to the *Lysimachiæ species fructu caryophylloideo* of Hermann (*Thes. Zeyl.* 146.) together with the *Lysimachia indica, non papposa, repens, flore*

flore pentapetalo, fructu caryophylloide of Ray, which is probably the same plant; but then he united it with a plant of Sloane, and with the *Herba Vitiliginum* of Rumphius, both having yellow flowers, and with the *Kikirindia* of the Ceylonese. Some mistake, I have mentioned in treating of the *Carambu*, seems to have happened to Linnæus respecting the *Kikirindia*, which is probably a plant in much request with the natives of Ceylon, as it has no less than five other names. Now the *Nir Carambu* in all parts of India is much used as a vegetable in the dishes of the natives, and therefore is likely to have many names.

Linnæus, joining the *Nir Carambu* with the plant of Ray already mentioned, called it *Jussiæa repens, floribus pentapetalis decandris, pedunculis folio longioribus* (*Fl. Zeyl. n.* 169.), which in the *Species Plantarum* became the *Jussiæa repens*. It is remarkable, that in the *Flora Zeylanica* no Ceylonese name should be attached to a plant so common and so much used; while no less than six names are given to the insignificant *Ludwigia*. This confirms me in the suspicion already mentioned, that some transposition of names has taken place, and that the *Lysimachiæ species fructu caryophylloideo Kikirindia zeylonensibus* of Hermann and Burman (*Thes. Zeyl.* 146.), with all its additional barbaric names, actually belong to the *Jussiæa repens*, while the *Dyanilla* (*Linn. Fl. Zeyl.* 498.) is the *Ludwigia diffusa* or *Carambu*.

It would indeed appear, when the younger Burman published the *Flora Indica* (103.), that he, and probably Linnæus, had become sensible of this mistake in the *Flora Zeylanica*; for among the synonyma of the *J. repens* we have the *Lysimachia fructu caryophylloideo Kikirindia zeylonensibus* of Burman, thus setting every thing right: but by some fatality this quotation is omitted by Willdenow, who refers to the *Flora Zeylanica* alone (*Sp. Pl.* ii. 574.), and does not mention Burman; and the same is the case with M. Lamarck (*Enc. Meth.* iii. 330.). I think, therefore,

therefore, that we may safely place the following synonyma to the *Nir Carambu.*

Jussiæa repens. Burm. Ind. 103. *Enc. Meth.* iii. 330.
Jussieua repens. *Willd. Sp. Pl.* ii. 574. (exclusis synonymis Swartzii et Brownii). *Hort. Beng.* 33.
Jussiæa repens, floribus pentapetalis decandris, pedunculis folio longioribus. *Linn. Fl. Zeyl. n.* 169.
Lysimachiæ species fructu caryophylloideo, Kikirindia zeylonensibus. *Burm. Thes. Zeyl.* 146. (exclusis synonymis Sloani et Rumphii).
Lysimachia indica non papposa repens, flore pentapetalo, fructu caryophylloide. *Commel. Malab.* 164. *Ed.* 8*vo.*
Caryophyllus spurius malabaricus pentapetalos aquaticus repens. *Raii Hist.* 1510.

PONNAM TAGERA seu PONNA VIREM, *p.* 101. *fig.* 52.

Although Commeline mentions, that of the five species of *Tagera* found in Malabar, two only are described by the authors of the *Hortus Malabaricus*, yet this must only mean that they are not described in this part of the work; for the other three are to be found, vi. *t.* 9. and 10.; vi. *t.* 25.; and ix. *t.* 30.; and it seems strange that Commeline should not have traced their affinity to genera then well known.

A plant very nearly allied to the *Ponnam Tagera* had been previously described under the name *Sophera*; and Plukenet, thinking it the same, calls it *Sena orientalis fruticosa Sophera dicta* (*Alm.* 342.); but joins it with a Mexican plant described by Hernandez and Camerarius, that is probably different; although it must be confessed that the *Cassia occidentalis* of America would seem to have a remarkably close resemblance to the *Ponnam Tagera.*

The

The elder Burman quotes the *Ponnam Tagera* for his *Senna vigintifolia siliquis teretibus* (*Thes. Zeyl.* 213.); but the figure which he gives (*t.* 98.) represents the legumina very differently from the figure of Rheede, and such as I have never seen; especially as they would seem to be hairy, which we may conclude is actually the case, as he quotes the *Sophera congener planta, siliqua compressis hirsutis, seminibus atris lucidis floribus aureis* of Hermann. But the legumina of the *Ponnam Tagera* are smooth; and I therefore suspect that it is not the plant which Burman describes, especially as it very rarely has near ten pair of leaflets. Burman further considers, that Plukenet was mistaken in considering the Indian *Sophera* as the same species with the *Sophera* of Egypt described by Alpinus, J. Bauhin and Parkinson; and he quotes several authorities supporting his opinion, which I conclude is right.

When Burman composed his *Thesaurus Zeylanicus*, he considered the *Ponnam Tagera* as the same with the *Flos flavus* of the *Herbarium Amboinense* (iv. 63. *t.* 63.); but of this error he became sensible by the time that he published this great work of Rumphius, who merely says that the plants are of the same genus; and it is now admitted, as pointed out by Burman, that Rumphius described the *Ponnam Tagera* by the name of *Galinaria acutifolia* (*Herb. Amb.* v. 283. *t.* 97. *f.* 1.), although Rumphius himself, owing probably to his blindness, had been led to suppose that his *Galinaria acutifolia* was the *Tagera* of Rheede.

Linnæus, in forming the *Ponnam Tagera* into a species with the *Senna vigintifolia* of Burman (*Fl. Zeyl.* 150.), seems to have adopted the opinion of Burman, that this was not the *Sophera* of Egypt, as he quotes no author that could be supposed to describe the African species; but unless Burman describes a plant different from the *Ponnam Tagera*, and unless Linnæus meant to describe this plant of Burman, he gives a faulty specific character

racter (*foliolis decem parium*); for, as I have said, it is very uncommon to find a specimen of the latter that has near this number of leaflets. Linnæus indeed omits the plant of Hermann *siliquis hirsutis*, quoting only the plant of this author mentioned by Plukenet; nor is it easy to say whether he meant to describe the plant of Burman or that of Rheede, if they be really different, as I suspect. It is to be observed, however, that he does not quote the Ceylonese name *Mahatora*, given to this plant by Burman, which would appear not to have been in the collection submitted to his inspection: and this, joined to his not quoting the plant of Hermann *siliquis hirsutis*, both probably belonging to the *Senna vigintifolia*, may induce us to believe that then Linnæus meant the *Ponnam Tagera*. He did not at first quote Rumphius.

Although, as I have said, the *Ponnam Tagera* is not the original *Sophera*, an African plant; yet Linnæus, on bestowing specific names, called it *Cassia Sophera*, by which name it is now always known. The younger Burman (*Fl. Ind.* 97.) added to the synonyma the *Gallinaria acutifolia* of Rumphius, and the *Galegæ affinis* of C. Bauhin, both of which no doubt belong to the *Ponnam Tagera*; but he also added the *Sopheræ congener planta, siliquis compressis hirsutis, seminibus atris lucidis, floribus aureis* of Hermann. This throws every thing again into the confusion introduced by the elder Burman. The younger Burman indeed probably really meant his father's plant *legumine hirsuto*; for I am convinced that the plant of Java which he confounded (*Fl. Ind.* 96.) with the *Cassia occidentalis* was merely a specimen of the *Ponnam Tagera* with only four or five pair of leaflets, a very usual number. In Ava I was deceived by a similar specimen, which I sent home under the same name, and which is now probably in the collection of Sir J. Banks.

Willdenow indeed omits both the synonyma of Hermann,

conscious, perhaps, that they could not belong to the same species, and not knowing which to select; but he quotes both the *Ponnam Tagera* and the *Senna vigintifolia* of Burman for his *Cassia Sophera* (*Sp. Pl.* ii. 525.), leaving us without any hint to enable us to judge which he meant. He had not indeed seen the plant.

M. Lamarck, having seen specimens, fails not to observe that the legumen is not cylindrical, as asserted by Burman. It is therefore clear that he meant the *Ponnam Tagera*, although he quotes also Burman (*Enc. Meth.* i. 649.).

Dr. Roxburgh thought that there were three species of *Cassia* very nearly allied, the *C. Sophera*, *C. esculenta* and *C. purpurea* (*Hort. Beng.* 31.), and furnished me with the characters by which he thought they could be distinguished; but after much labour bestowed on examining many specimens in different situations and places, I could not observe any of these characters, that could be considered so appropriate to these different varieties, as to satisfy me that they were really distinct species. The furthest that I have been enabled to advance towards satisfaction on this point is, that perhaps the *Gallinaria acutifolia* of Rumphius may be considered as the *C. esculenta*, and may be distinguished *petalo supremo integro* from the *Ponnam Tagera* or *C. Sophera petalo supremo retuso*; but I am unwilling to rest on such minutiæ.

It must be observed that, before the legumen is fully ripe, it is much flatter than when it has come to maturity, when it is very turgid, although always compressed. Specimens from Ava, which I collected in this state, and with four or five pair of leaflets, as usual, were sent home under the name of *Cassia planisiliqua*; while those with fully matured legumina and more numerous leaflets, collected on the same journey, and compared by Dr. Roxburgh with his drawings, were called *C. purpurea*. Both are now probably under these names in the Banksian herbarium; and

and specimens of the three different varieties or species of Dr. Roxburgh have been placed in the East India Company's collection.

TAGERA, *p.* 103. *fig.* 53.

Plukenet, quoting the synonyma of Ray and Breynius, both of whom would seem to have described this plant, calls the *Tagera Senna spuria orientalis tenuissimis siliquis tetraphylla* (*Alm.* 342.).

Rumphius, as I have said when treating of the *Ponnam Tagera*, confounded the *Tagera* with his *Gallinaria acutifolia* (*Herb. Amb.* v. 284.); but his *Gallinaria rotundifolia* (*l. c. t.* 97. *f.* 2.) should rather have been quoted; although he himself considered this as the *Kattu Tagera* (*Hort. Mal.* ix. 55. *t.* 30.). This, however, is evidently a mistake, as the *Kattu Tagera* is undoubtedly the *Indigofera hirsuta*, while the *Gallinaria rotundifolia* is as clearly a *Cassia*, and may at any rate be considered as scarcely different from the *Tagera*.

It was no doubt from this plant that Linnæus derived his name *Cassia Tagera*; and accordingly the younger Burman (*Fl. Ind.* 95.) under that name unites the synonyma of Rheede, Ray, Breynius and Plukenet, already mentioned; and so far is well: but then he joins this annual plant with the *Cassia seu Senna spuria tetraphylla arborescens, siliquis tenuibus longissimis pendulis* of Ammannus.

M. Lamarck under the name of *C. Tagera* describes the *Tagera* of Rheede, omitting the synonyma quoted by Linnæus; and not only doubts of Linnæus having actually seen this plant, and therefore supposes him to have described some other, but he considers the *Tagera* of Rheede to be a mere variety of the *Cassia Tora* of Linnæus (*Enc. Meth.* i. 643.). M. Lamarck thus quotes the *Tagera* for his *C. Tagera*, and the *Gallinaria rotundifolia* for his *C. Tora*, considering them as mere varieties of each other. In fact, the name *Tachara*, which Plukenet (*Mant.* 170.)

says the Malabars give to the *Tala* or *Tora* of Ceylon, is evidently the same word with the *Tagera* of Rheede, although Plukenet distinguishes the plants from one having two and the other three pair of leaflets, a very insufficient mark of distinction.

Willdenow (*Sp. Pl.* ii. 515.) with propriety, as a mere editor of Linnæus, continues to describe the *Cassia Tagera* in the words of the original author; but he quotes with doubt the *Tagera* of Rheede; and he extends this doubt to the plant of Ammannus, quoted by Linnæus, as the *Tagera* of the latter was a *fruticulus procumbens*, while the plant of Ammannus is arborescent, and the *Tagera* of Rheede is a strong annual plant two or three feet high. Far, however, from attending to the mark of distinction pointed out by Plukenet of the *Tagera* having four leaflets and the *Tora* six, Willdenow in the specific character of both has *folia trijuga*; but, to show how little consequence he attached to number, in describing the *Tagera foliis trijugis*, he says *foliola quatuor*. As a variety of the *C. Tora* Willdenow adds an American plant described by Plumier; while he removes the *Gallinaria rotundifolia* of Rumphius, and joins it with another American plant, the *C. obtusifolia* of Linnæus; but, as I have said, I think that this plant of Rumphius can be scarcely considered as different from the *Tagera*.

Neither Roxburgh (*Hort. Beng.* 31.) nor the *Hortus Kewensis* (iii. 25.) quotes either Rheede or Rumphius for the *C. Tora*. The plant, however, which is meant in both works is probably the same, that is, the *Cassia siliqua quadrangulari* of Dillenius and the elder Burman (*Thes. Zeyl.* 56), although most of the synonyma quoted by the latter are by Willdenow rejected as belonging to a variety, or rather to a distinct species. Some of these synonyma at least belong to a plant, which I found very common in Mysore, and sent the seeds to Dr. Roxburgh, who considered it as forming a species very nearly allied to the *C. Tora*, and

and on that account called it *C. Toroides*; but I think it is the *Tagera* of Rheede, and scarcely different from the *Gallinaria rotundifolia* of Rumphius. I therefore consider this *C. Toroides* as the *C. Tagera* of M. Lamarck; and I also consider the *Gallinaria rotundifolia* or *C. Tora* of M. Lamarck as a plant scarcely sufficiently different to be distinguished as a species.

NANDI ERVATAM MAJOR, *p.* 105. *fig.* 54.

NANDI ERVATAM MINOR, *p.* 107. *fig.* 55.

In my Commentary on the first part of the *Hortus Malabaricus*, when treating of the *Curutu Pala*, I have stated it as my opinion, that the *Nandi Ervatam major* is the *Nerium coronarium flore pleno*, which is a *Tabernæmontana*; and that the *Nandi Ervatam minor* is probably, although not certainly, the *Nerium* or *Tabernæmontana coronaria* in a single state. I have there given an account of the plants and of their synonyma, to which I must refer the reader*; nor on consideration do I think it necessary to say more on this subject, as I intended when I wrote that Commentary.

CAPO MOLAGO, *p.* 109. *fig.* 56.

I know only one species of *Capsicum*; and what botanists still continue to call species, I consider as merely such varieties as arise among all plants much cultivated, and not more different from each other than the kinds of gooseberry common in our gardens. It must however be confessed, that by different modes of treatment some plants die annually, while others last for years; but with us, in India at least, this depends more on the management than on the kind. The plant, I suspect, is an exotic in India; but on its introduction into Malabar, on account of its qualities in seasoning food, obtained the generic appellation of

* *Trans. Linn. Soc.* vol. xiii. p. 519.

Molago,

Molago, previously given to the native *Piper nigrum*. *Capo*, the specific name, would seem to imply that it came originally from Africa, the natives of which, and not an Indian tribe, as Commeline asserts, are known in Malabar by the name Capo or Capro, derived from the Cafree, or rather Kaffur of the Arabs, who settled very early in Malabar, and who, having early much communication with Zanguebar and Mosambique, probably brought the Capsicum from thence, as those from Guinea took it to America. I must however confess, that the authority of Rumphius, always of the greatest weight, is here against me. We learn indeed from Mr. Maxwell, that this plant (Cayenne pepper) grows spontaneously in Congo (*Edin. Phil. Journ. n.* xi. 67.); but this, so far as I have seen, is not the case in either the East or West Indies.

The *Capo Molago* by Plukenet was called *Solanum mordens fructu oblongo pendulo minore* (*Alm.* 353.), and was quoted by the younger Burman for the *Capsicum annuum* (*Fl. Ind.* 57.); but, if this be the *Capsicum siliquis longis propendentibus* of Tournefort, the *Capo Molago* is a different variety, being the *C. minus flavum* of Rumphius, and having shorter and blunter berries. It is not quoted by Willdenow, unless, being included in the *Capsicum indicum* of Rumphius, it belongs to the *C. frutescens:* but the *C. indicum* of Rumphius includes three varieties, two of them more different from this than the *C. annuum* is.

The *Capo Molago* is not quoted in the *Encyclopédie*; but it probably is the *Capsicum luteum* of that work (v. 327.), called by the French *Piment de Mozambique*, from whence I suppose it came.

XIII. *The*

XIII. *The Natural History of Xylocopa Teredo and Horia maculata. By the Rev. Lansdown Guilding, B.A. F.L.S.*

Read June 4, 1822.

Insects, though seemingly the most insignificant of animal beings, have an important task assigned them by our great and good Creator. Though the period of their activity and existence is soon closed, and their size appears contemptible, nothing can long resist their attacks. Their utility is equal to their power. In innumerable instances they conduce to the comforts and pleasures of the human race; but it is chiefly, perhaps, as scavengers that they are serviceable in the boundless field of nature. Without the labours of these puny agents the atmosphere would abound in effluvia fatal to life. Without their aid, the low and lovely plants that adorn our valleys, the stately tenants of our forests, with all their parasites, would want room for development. If man be sometimes a miserable sufferer from the united or unrestrained attacks of these active invaders of his rights, he cannot, on reflection, but confess, that they are wisely and kindly given for the general welfare of the universe. The decomposition of timber hastening to decay, is accelerated by no insect, perhaps, more than by the Bee, which is the subject of this communication. Independent of its singular habits, the striking difference of the sexes will, I doubt not, render the species worthy of the notice of the Linnean Society. The description of its destructive parasite has been added to make its history complete.

St. Vincent, Jan. 1, 1822.

HYMEN-

HYMENOPTERA. *Linn.* PIEZATA. *Fabr.*

APIDÆ.

XYLOCOPA. *Latr.* APIS. *Linn.*

XYLOCOPA TEREDO.

Femina. TAB. VIII. Fig. 1.

X. tota hirsuta aterrima, alis æneo-purpurascentibus latis.
An Xylocopa morio, *Fab. Syst. Piezat. p.* 338. 2?

DESC. *Caput* magnum, depressum. *Mandibulæ* validissimæ. *Alæ* nonnunquam atro-purpurascentes, margine exteriori atomis sparsis ornato. *Abdomen* latum, lateribus hirsutissimis. *Pedes* validi, hirsutissimi.

Habitat in Americæ æquinoctialis insularumque oppositarum truncis exsiccatis, quos perforat, longitudinaliter excavat, ibique plures nidos (sæpenumero vix separatos at nunquam, quod mirum, confusos) singulos annulis ligneis mirâ arte confectis distinctos, a fundo incipiens polline herbarum melle mixto replet; et unicuique ovum concredit.

Horiâ maculatâ infestantur familiæ quam obviam sæpe crudeliter trucidat apis parens. Die stridore magno flores petit mellisuga. Nidos amissos quos odor gratissimus monstrat sedule quærit. Capite adempto diu vacillat vitæ tenax.

Ovum maximum, molle, hyalino-pallidum, curvum, extremitate hac illâ majore.

LARVA (*tab.* viii. *fig.* 2. et 3.) apus, nuda, lactea, caput versus attenuata:

attenuata. *Caput* parvum, ochraceum, mandibulis rufescentibus. *Corpus* segmentorum tredecim, spiraculis ochraceis. Animal, dum pascit, scybala fusca filamentosa concatenata ex ano protrudit.

PUPA junior ochracea: *thorax* antice spinulis duabus obtusis: *anus* mucrone lato apice acuminato.

Mas? Tab. VIII. Fig. 5.

Flavo-rufescens hirta, subtus nigricans, capite parvo.

Apis Brasilianorum, *Linn. Syst. Nat.* ii. 961. 49.

Desc. *Antennæ* subtus flavæ. *Alæ* pallidæ pterigostiis ferrugineis, margine externo atomis ornato.

Habitat semper cum præcedente (sine dubio mas, nam semper inermis) in labyrinthis feminâ excavatis. Copulâ junctos sexus nunquam observavimus.

TEMPUS. Per totum annum occurrit imago. Larva pupaque mensibus Feb. Oct.

Mores Generis Xylocopæ (*Abeilles perce-bois*) accuratissime descripsit celeberrimus Reaumur. *Tom.* vi. *p.* 39.

COLEOPTERA.

CANTHARIDÆ.

HORIA. *Fab., Oliv.*

Horia maculata.

Tab. VIII. Fig. 6.

H. flavescens, elytris maculis septem nigris. *Fabr. Ent. Syst.* i. 2. *p.* 90. *Syst. Eleuth.* ii. *p.* 85.

Horia maculata. *Oliv. Ins.* iii. 53. bis. *tab.* 1. *fig.* 1.

Cucujus maculatus. *Swed. Act. Holm.* 1787.
Mus. Britan., Dom. MacLeay, nostr.

DESC. *Corpus* totum flavum; mandibulis, antennis, oculis, pedibusque (excepto femorum basi) atris. *Alæ* flavo-rufescentes, apice nigricantes. *Elytra* maculis septem atris 2. 2. 2. 1. anticis nonnunquam cohærentibus, ultimâ terminali.

Var. β. Corpus pallidius maculis elytrorum utrinque septem distinctis minoribus.

Long. corp. 1 un. 4 lin.

Habitat in Americâ æquinoctiali.

LARVA (TAB. VIII. Fig. 2. *g.*) hexapus, pallidè ochracea, nuda, nitida, ore nigricante.

PUPA (Fig. 2. *h.*) nitida, oblonga, flavescens, lineâ dorsali ochracea; oculis, mandibulis, membrisque saturatioribus.

Nidis Xylocopæ Teredinis nutritur. Forsan dum larva cibum apibus præparatum avidè consumit, hospes fame perit. Mox matura proprium nidum (Fig. 2. *i.*) excavat? introitum claudit (*k.*), ac metamorphosin subit.

TEMPUS. Imago mensibus Jun., Jul., Dec., Feb. Larva pupaque Martio et Feb. mihi obviæ.

TABULÆ

Lansdown Guilding del.

I. Curtis sculp.

TABULÆ VIII. EXPLICATIO.

Fig. 1. Xylocopa Teredo, Femina.

2. Truncus exsiccatus Xylocopâ terebratus.

a. a. a. a. Nidi Xylocopæ.

b. b. b. Annuli lignei.

c. Foramen quo intrat imago, situ ab imbribus semper securum.

d. d. Labyrinthi.

e. Cibus larvarum.

f. Larva junior Xylocopæ.

g. Larva junior Horiæ.

h. Pupa Horiæ.

i. Nidus Horiæ larvâ excavatus? quisquiliis clausus (*k.*)

3. Larva adulta Xylocopæ.

4. Pupa matura Xylocopæ.

5. Xylocopa Teredo, Mas.

6. Horia maculata, vix aucta.

XIV. *On the Nature of the Marine Production commonly called Flustra arenosa. By John Hogg, Esq. B.A. F.L.S.*

Read March 18, 1823.

THE singular form and appearance of the marine substance commonly called *Flustra arenosa*, induced me lately to make the following observations, which I beg leave to lay before the Society, with its synonyma.

Flustra arenosa, crustacea arenosa lutosa, poris simplicibus subquincuncialibus. *Solander and Ellis Zooph. p.* 17. *n.* 10. *Gmelin Linn. Syst. Nat. vol.* i. *p.* 3829. *n.* 13. *Boys in Trans. Linn. Soc. vol.* v. *p.* 230. *tab.* 10.

Flustre aréneuse, crustacée, friable, jaunâtre; cellules simples presque en échiquier. *Lamouroux Polyp. Corall. Flexibles, p.* 111. *n.* 220. *Bosc Hist. Nat. de Vers*, iii. *p.* 118.

Flustre arenacée. *Blainville in Diction. des Scien. Natur.*

Eschara (lutosa) crustacea arenaceo-lutosa, poris simplicissimis subquincuncialibus. *Pallas El. Zooph. p.* 37. *n.* 5.

Eschara Millepora arenosa Anglica. *Raii Syn. p.* 31. *Petiveri Mus. n.* 271.

English Sandy Millepora. *Ellis Coral. p.* 74. *pl.* 25. *fig. e.*

Alcyonium arenosum, flat, semicircular, consisting of agglutinated sand, pale yellowish-brown. *Turton Gmel. Syst. Nat. vol.* iv. *p.* 654. *Shaw Nat. Miscell. tab.* 272.

An Discopora cribrum, Discopore cribre? *Lamarck Anim. sans Vertèbres, vol.* ii. *p.* 167.

This

This production is ranked by Ellis and Gmelin as a species of the genus *Flustra*, which belongs to the order *Vermes Zoophyta* of Linnæus; although Ellis is uncertain whether it belongs to that genus or not; and Gmelin also appears to doubt whether it be a *Flustra*. Mr. Boys in vol. v. of the *Trans. Linn. Soc.* above quoted, states that he considered it undoubtedly to be the *nidus* of some marine animal, as he had found the cells entire, with eggs in each; but later naturalists (Blainville perhaps alone excepted) do not agree with him in this opinion.

The shape of this substance is curious; it greatly resembles the hoof of a colt, and is about equal in thickness to the peel of an apple or of an orange.

It is composed of fine particles of sand, cemented by animal gluten, and forms a crustaceous substance of a semicircular shape, very friable when dry. If a piece be held to the light, it will appear full of circular cells, which are in some degree transparent, and placed nearly in a quincunx order. Upon opening the cells, I discovered in each, one or two minute testaceous bodies of a yellowish colour, which are transparent and very brittle. In the interior of these I further observed an orange spot, darker than the rest of the shell, and which I conjectured to be the dead animal belonging to the shell.

In order to ascertain more accurately the nature of this substance, and of the small shells I had observed in the dry specimen, I procured fresh from the sea on the coast of Durham, where it abounds, a piece, which I placed immediately in a glass of sea-water, and changed the water occasionally. A few days after, the embryo shells hatched; I examined them with a microscope, and found that they bore a perfect resemblance to the young shells of the *livid Nerite* (*Nerita glaucina* of Linn.). The animal contained in each was white, and had two very minute black

black specks situated on the front, which I concluded without doubt to be its eyes.

Tab. IX. Fig. 1. represents, in its natural size, the under surface of a portion of this substance, broken through the middle of a perfect specimen, at right angles to its edge; and shows plainly the arrangement of the shells, which are expressed by the shaded parts of the drawing.

Fig. 2. is a similar section, somewhat magnified, to exhibit more clearly the forms of the cells, contained between the two layers of conglutinated sand.

Fig. 3. represents one of the minute shells in its natural size.

Fig. 4. is a back view of the same, highly magnified.

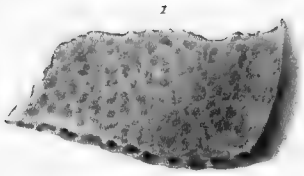
Fig. 5. is a young shell of *Nerita glaucina*, seen also from the back; which is here introduced to be compared with the last figure. And for the same reason, Fig. 6. shows the aperture and umbilicus of the shell, Fig. 5., in order to prove the exact resemblance which it bears to Fig. 7., another small shell, represented from the side of the aperture and umbilicus, and magnified on the same scale as Fig. 4.

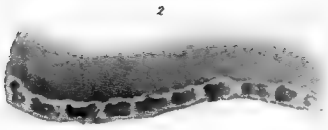
Fig. 8. is the same as Fig. 7. in its natural size.

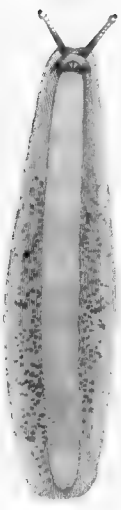
The exact similitude of these small testaceous bodies to the *livid Nerite*, induces me to believe that they are the young of that species.

This substance is sometimes found with a small hole in each of the cells opening on the under surface (as at Fig. 1.): this hole is formed by the shell contained in the cell, which, when sufficiently grown, forces its way through the under coating of sand, and thus exchanges its former abode for the shore.

If a part of this production, when perfectly dry, be immersed in muriatic acid, it will slightly effervesce, and the calcareous particles will be dissolved; and others which are indissoluble, will be







J. Curtis sculp.

be precipitated, and will leave a membranaceous covering on both sides of the shells, and make the small shells contained in them very conspicuous.

On comparing what has been said of this substance, with the character of the genus *Flustra*, or of any other genus belonging to the order *Vermes Zoophyta*, it will be evident that it cannot be referred to that genus; but is rather to be considered as the matrix of *Nerita glaucina*, in which the embryo shells are retained and preserved, until they have arrived at sufficient growth to obtain nourishment for themselves, and to support an independent existence.

XV. *De-*

XV. *Description of a new Species of Onchidium. By the Rev. Lansdown Guilding, B.A. F.L.S.*

Read November 4, 1823.

Genus Onchidium, etsi paucas continet species, per totum fere orbem dispergitur. *O. Typhæ*, quod primum descripsit Dom. Buchanan generis conditor, in regione Bengalensi obvium: *O. celticum* in Europa hospitatur; dum nostrum animal est Antillarum incola. Nomen genericum, monente Cuviero, vix laudandum, unica enim species certe lævis, et aliæ tantum scabræ.

MOLLUSCA.

GASTEROPODA.

LIMACIDÆ.

ONCHIDIUM. *Buchanan.*

Char. Gen.

Corpus oblongum, repens, subtus planum.
Penula carnosa, pedem totum tegens.
Os anticum, longitudinale, maxillis nullis.
Anus posticus, infernus juxtà orificium respiratorium.
Tentacula duo, retractilia, cylindrica, oculis terminalibus.
Brachia duo, sive tentacula inferiora, labriformia, subcompressa, os cingentia.
Animal hermaphroditum moribus limacis. Verba forsan in hoc loco

loco laudanda sint quæ Cuvierus *Onchidio Peronii* dissecto tam bene scripsit.

" D'après la ressemblance du poumon avec celui des mollusques terrestres de notre pays, d'après la nature même de son organization beaucoup plus analogue à celle des vrais poumons de quadrupedes ou surtout de reptiles, qu'à celles des branchies des poissons, j'aurois cru que *l'Onchidie* etoit aussi un mollusque terrestre, et il a fallu pour m'en dissuader la certitude qu'a M. Peron de l'avoir toujours trouvé dans l'eau." *Ann. du Mus. d'Hist. Nat.* v. *p.* 41.

Species sic distribuantur.

* *Dorso verrucoso.*

1. O. *Typhæ. Buchanan in Act. Soc. Linn. tom.* v. *p.* 132. *tab.* 5. *fig.* 1. 2. 3.

** *Dorso tuberculato.*

2. O. *Peronii. Cuv. Ann. Mus.* v. *p.* 37. *tab.* 6. *Lam. Anim. sans Vert.* vi. 2. *p.* 46.
3. O. *Sloanii*, corpore lato cinerascente maculis nigris. *Cuv. Regne Anim.* ii. *p.* 411. *Sloan. Hist. Jam. tom.* ii. *tab.* 233. *fig.* 2. 3.
   Gigas in hoc genere.
4. O. *Celticum. Cuv. Regne Anim.* ii. *p.* 411.
5. O. *occidentale*, dorso fusco atomis brunneis elevatis sparsis, ventre pallido: lateribus livido-maculatis, brachiis apice divisis.

TAB. IX. Fig. 9—12.

Habitat satis frequens in locis humidioribus elevatis Insulæ S^{ti} Vincentii, ubi per diem sub lapidibus contractum latet.

Ova oblongo-elliptica, flavescentia, gelatinosa, filo connexa, numero 20, in globum convoluta, in umbrosis deponit.

Animal nuper exclusum pallidum, collo caudâque nigricantibus.

*** *Dorso lævigato.*

6. O. *lævigatum*. *Cuv. Regne Anim.* ii. *p.* 411.

EXPLICATIO FIGURARUM.

TAB. IX.

Fig. 9. O. *occidentale* repens, membris extensis.
10. Idem supinum.
11. Ova.
12. Animalculum nuper exclusum.

XVI. *Descriptions of Nine new Species of the Genus Carex, Natives of the Himalaya Alps in Upper Nepal. By Mr. David Don, Lib. L. S.*

Read December 2, 1823.

Among a collection of specimens of Nepal plants, received by Mr. Lambert, some time ago, from Dr. Wallich, I was fortunate in meeting with nine species of the genus *Carex*, which, on a careful investigation, prove to be different from any hitherto recorded in the writings of botanists. These species appear to have a greater affinity to the European than to the American portion of the genus. They are only to be considered as a small proportion of the species yet to be discovered in the Nepalese alps: for, when the extensive range of lofty mountains, which extend along the northern frontier of Nepal, shall become better known to botanists, we have every reason to believe that a rich harvest of new species will be added, both to this and to the other genera of the family of *Cyperaceæ*. In the formation of the characters of the new species I am about to describe, and which I have now the honour of submitting to the Linnean Society, I have followed as a model the admirable Monograph of the British species of this genus, by a learned Vice-President of this Society, the Lord Bishop of Carlisle, and printed in the 2d volume of the Society's Transactions. His Lordship justly remarks, that a generic character is still wanting for this extensive and diversified genus; and I am further inclined to think

with him, that it will be found, perhaps, expedient to divide it into several genera: for *Carex*, as at present constituted, may rather be regarded as a tribe of the family *Cyperaceæ*, than as constituting a solitary genus.

* *Spicâ compositâ, androgynâ.*

1. *C. nubigena*, digyna; spiculis sub-novenis ovatis confertis, arillis ovatis striatis rostratis bifidis margine denticulato-scabris, glumis ovatis acuminatis, culmo striato nudo infernè tereti, foliis involutis.

   Habitat in summis alpibus Nepaliæ. *Wallich.* ♃.

   Radix fibrosa, cæspitosa. *Culmi* numerosi, erecti, palmares v. nunc ferè pedales, striati, glabri, nudi, fistulosi, lenti, infernè, e medio ad basin usque, teretes, apice ancipiti-compressi; altero latere convexo. *Folia* angustè linearia, acuta, glabra, pallidè viridia, culmis breviora, primò erecta, dein recurvata, subtùs striata, semilineam lata, apicem versus attenuata, margine asperè crebrèque denticulata. *Bracteæ* angustè lineares, striatæ, apice attenuatæ et triquetræ, marginibus dorsoque scabræ, spicâ duplò triplòve longiores. *Vaginæ* nullæ. *Spica* composita, densa, ferè uncialis. *Spiculæ* ovatæ, 6, 8, sæpiùs 9 confertæ, 2 lineas longæ. *Glumæ* ovatæ, argenteæ, nitidæ, demùm rufescentes, dein apice decidente arillis breviores: *nervo* valido scabro, in acumen deciduum ultra squamam ipsam producto. *Arilli* subrotundo-ovati, rostrati, striati, suprà concaviusculi, subtùs convexi, apice bifidi et incurvi; *margine inferiore* alato ac inermi; *superiore* denticulis scabro.

The rounded naked culms of this species, and its involute leaves, which give it a distant resemblance to some species of *Scirpus*,

Scirpus, had suggested to me at first the trivial name of *Scirpoides*, as being applicable to it; but, as there is already another species to which this appellation has been given, I have proposed for it the name of *Nubigena*, in allusion to the elevated regions in which it grows.

2. *C. foliosa*, digyna; spicâ elongatâ, spiculis ovato-oblongis adpressis; inferioribus subremotis, arillis ellipticis brevè rostratis bifidis margine lævibus, glumis ovatis aristatis, culmo acutè triquetro scabro, foliis planis.
Habitat in Nepaliæ alpibus. *Wallich.* ♃.

Radix fibrosa, densè cæspitosa. *Culmi* erecti, foliosi, acutè triquetri, solidi, foliis breviores: *angulis* scabris. *Folia* linearia, plana, spithamæa v. ferè pedalia, lineam lata, utrinque lætè viridia, margine carinâque infernè scabra, apicem versus attenuata, triquetra ac asperiùs denticulata. *Bracteæ* setaceæ, asperæ, spiculis sæpè multò longiores. *Vaginæ* nullæ. *Spica* composita, bipollicaris. *Spiculæ* numerosæ (12—16), ovato-oblongæ, adpressæ, sessiles. *Glumæ* ovatæ, cinereæ, scariosæ, nitidæ: *nervo* valido, viridi, ultra squamæ ipsius apicem protenso, aristamque constituente. *Arilli* elliptici, brevè rostrati, squamis breviores, margine læves, apice bifidi.

** *Spicis distinctis, apice masculis.*

3. *C. lenta*, digyna; vaginis elongatis pedunculo brevioribus, spicis filiformibus cernuis apice masculis, glumis ellipticis acutis, arillis ovatis striatis pilosis rostratis.
Habitat in Nepaliæ alpibus. *Wallich.* ♃.

Radix fibrosa. *Culmi* erecti, bipedales, graciles, trigoni, læves. *Folia* erecta, linearia, plana, pallidè viridia, glaucescentia,

cescentia, subtùs lævia, suprà striata ac scabra, culmis multò longiora, infernè conduplicata. *Bracteæ* angustè lineares, apice setaceæ, suprà margineque scabræ, sæpè spicis duplò longiores: *vaginis* elongatis, teretibus, striatis, læviusculis, pedunculo duplò breviores, demùm ad basin usque hiantibus. *Pedunculi* longi, capillares, compressi, denticulato-scabri; *inferiores* bi- v. tri-pollicares. *Spicæ* plures (3—9), solitariæ, remotæ, breves, cylindraceæ, tenues, cernuæ, simplices v. subcompositæ, apice masculæ. *Glumæ* ellipticæ, acutæ, pallidè fuscæ, scariosæ, nervo viridi carinatæ. *Arilli* ovati, costati, compressiusculi, longè rostrati, pilis brevibus asperati, glumis multò longiores, apice bifurci.

4. *C. macrolepis*, digyna; vaginis elongatis pedunculo brevioribus, spicis strictis cylindraceis apice masculis, glumis lanceolatis longè cuspidatis, arillis ovatis rostratis scaberrimis costatis apice bipartitis.

Habitat in Nepaliæ alpibus. *Wallich.* ♃.

Radix fibrosa. *Culmi* stricti, obtusè trigoni, glabri, virides, striati, spithamæi v. pedales, foliosi. *Folia* linearia, plana, nervosa, vix lineam lata, glauca, suprà margineque scabra, subtùs lævia; *radicalia* culmis longiora. *Bracteæ* lineares, foliaceæ, longissimæ, suprà scabræ; inferioribus culmum æquantibus. *Vaginæ* elongatæ, tubulosæ, glabræ, sulcatæ, pedunculo duplò breviores. *Pedunculi* graciles, stricti, compressi, margine denticulati. *Spicæ* plures (5—6), solitariæ, distantes, cylindraceæ, strictæ, apice masculæ. *Glumæ* lanceolatæ, margine niveæ, dorso virides, ad apicem nervo medio in aristam longissimam denticulato-scabram producto. *Arilli* ovati, compressiusculi, longè rostrati,

rostrati, costati, setis numerosis exiguis scaberrimi, glumis breviores, apice altè bifurci.

This species agrees in some respects with the *Carex hirta*; but this last belongs to a different section, having terminal, distinct, male spikes; the leaves are also green, and generally clothed with soft hairs; the fruit is hairy, with a shorter beak, constantly longer than the glumes, which are broader, more scariose, and terminated by a much shorter and less rigid point. In the male spikes the glumes are broad, ferrugineous, and shortly pointed. The *Carex hirta* being trigynous is also an important differential mark.

5. *C. longipes*, digyna; vaginis elongatis pedunculo 4-plò brevioribus, spicis cylindraceis erectis apice masculis, glumis ellipticis aristatis, arillis ovatis costatis glabris rostratis.
Habitat in Nepaliæ alpibus. *Wallich.* ♃.

Radix fibrosa. *Culmus* erectus, lentus, sesquipedalis, obtusè trigonus, sulcatus, glaber, nitidus. *Folia* linearia, plana, viridia, striata, lineam lata, margine scabra, culmis breviora, apice mucronata. *Bracteæ* foliaceæ, pedunculorum longitudine: *vaginis* elongatis, sulcatis, glabris, pollicaribus v. ultrà. *Pedunculi* erecti, graciles, ancipiti-compressi, 4—7 pollices longi: *angulis* apicem versus scabris. *Spicæ* cylindraceæ, erectæ, pollicares, simplices, rarò basi spiculâ unicâ laterali auctæ, apice semper terminatæ spiculâ masculâ. *Glumæ* ellipticæ, pallidè fuscescentes, dorso virides, nervo medio in aristam longam scabrè denticulatam producto. *Arilli* ovati, compressiusculi, aristis glumarum multò breviores, costis pluribus notati, virides, apice longiùs rostrati, bifurci, omni parte, nisi rostrum, glabri, parùm lucidi.

6. *C. seti-*

6. *C. setigera*, trigyna; vaginis elongatis sulcatis, spicis cylindraceis strictis apice masculis; terminalibus omninò masculis, glumis latè ellipticis aristatis, arillis ovalibus triquetris rostratis scabris.

Habitat in Nepaliæ alpibus. *Wallich.* ♃.

Radix repens. *Culmi* erecti, pedales v. sesquipedales, foliosi, obtusè trigoni, infernè teretes, glabri, striati. *Folia* linearia, plana, rigida, subtùs carinata, glabra, suprà scabra, lætè viridia, apice mucronata; *radicalia* culmo longiora, basi sanguinea, et in vaginam longam cylindraceam, more *Caricis ampullaceæ*, rudimentis fibrosis connexam imbricata. *Bracteæ inferiores* longissimæ, foliis similes; *supremæ* setaceæ: *vaginis* sesqui- v. bipollicaribus, glabris, sulcatis. *Pedunculi* stricti, ancipiti-compressi, striati, omnino, nisi apices, læves, vaginis bractearum longiores, ipsi infra medium propriâ vaginulâ instructi. *Spicæ* fœmineæ strictæ, plures (4—5), sesqui- v. bipollicares, cylindraceæ, densæ, apice semper masculæ; *inferioribus* remotis, longiùs pedunculatis; *masculinis* terminalibus, paucis (2—3), sessilibus, strictis, fœmineis non absimilibus. *Glumæ* latè ellipticæ, ferrugineæ, nitidæ, margine scarioso argenteo, nervo lutescente ultra ipsius squamæ apicem in aristam setaceam producto. *Arilli* ovales, triquetri, rostrati, scabri, apice emarginati, glumis breviores.

The habit of this species approaches near to *Carex ampullacea*; but the obtuse glumes and the smooth inflated fruit in that species will prevent their being confounded.

**** Spicis sexu distinctis, masculis subsolitariis.*

7. *C. chlorostachys*, trigyna; vaginis nullis, spicis fœmineis cylindraceis erectis pedunculatis; masculis solitariis, glumis ovato-

ovato-lanceolatis acuminatis apice scabris, arillis ventricosis costatis apice rostratis bifurcis glumâ longioribus.

Habitat in Nepaliæ alpibus. *Wallich.* ♃.

Radix fibrosa. *Culmi* erecti, pedales, acutè triquetri, sulcati, virides: *angulis* asperè serrulatis. *Folia* linearia, plana, utrinque viridia, nervosa, membranacea, acuminata, culmis sæpè longiora, erecta, 2 lineas lata, suprà margineque asperè denticulata. *Bracteæ* foliaceæ, latè lineares, virides, apicem culmi superantes: *vaginis* nullis. *Pedunculi* semiunciam longi v. ultrà, capillares, triquetri, scabri. *Spicæ fœmineæ* 4, erectæ, pollicem v. sesquipollicem longæ, cylindraceæ, crassiusculæ, omnino virentes; *masculinæ* solitariæ, terminales, brevè pedicellatæ, unciales, filiformes. *Glumæ fœmineæ* ovato-lanceolatæ, acuminatæ, arillis breviores, virentes, apice scabræ; *masculæ* ovato-oblongæ, argenteæ, mucronatæ, apice asperæ. *Arilli* ovati aut elliptici, ventricosi, longè rostrati, bifurci, virides, costati, læves.

The *Carex Pseudo-cyperus*, to which our plant is next akin, differs from it in the female spikes being drooping; the glumes, both male and female, being terminated by a long rough spinulose point; in the fruit being shorter than the glumes, more strongly ribbed, and deeply forked. The leaves are also rougher above, and the whole plant nearly twice the size.

8. *C. lenticularis*, digyna; vaginis nullis, spicis fœmineis filiformibus pedunculatis patulis; masculis solitariis pedunculatis, glumis cuneatis: acumine longo spinuloso, arillis cuneato-orbiculatis papilloso-micantibus compressis marginatis.

Habitat in Nepaliæ alpibus. *Wallich.* ♃.

Radix fibrosa. *Culmi* erecti, sesquipedales, acutè triquetri, striati, ferè omni parte læves, glauci. *Folia* linearia, plana, glauca, spithamæa aut ultrà, lineam lata, lævia, ad apicem carinâ margineque spinuloso-scabra. *Bracteæ* foliaceæ, culmi apicem longè excedentes: *vaginæ* nullæ. *Pedunculi* capillares, teretiusculi, parcè spinulosi, pollicem v. sesquipollicem longi. *Spicæ fœmineæ* 4, patulæ, filiformes, pedunculis longiores; *masculæ* solitariæ, filiformes, erectæ, pedunculatæ, sesqui- v. $2\frac{1}{2}$ pollices longæ. *Glumæ fœmineæ* cuneatæ, scariosæ, fuscæ, dorso virides, apice acumine longo spinuloso terminatæ; *masculinæ* cuneato-oblongæ, scariosæ, fuscæ, apice truncatæ, nervo medio ultra ipsius squamæ apicem in mucronem brevem scabrum producto. *Arilli* cuneato-orbiculati, compressi, mitissimi, papilloso-micantes, fuscescentes, adpressè imbricati, ore virente obtuso marginati, glumis breviores.

9. *C. alopecuroides*, trigyna; vaginis nullis, spicis fœmineis erectis cylindraceis subsessilibus: masculis solitariis, glumis ellipticis acuminatis supernè scabris, arillis lanceolatis compressis lævibus apice truncatis emarginatis.

Habitat in Nepaliæ alpibus. *Wallich.* ♃.

Radix fibrosa. *Culmi* stricti, pedales v. sesquipedales, acutè triquetri, striati: *angulis* alatis, lævibus, apicem versus scabris. *Folia* linearia, mucronata, erecta, lætè viridia, culmos fere longitudine æquantia, lineam v. sæpiùs sesquilineam lata, striata, carinata, infernè inermia, versus apicem exasperata. *Bracteæ* foliaceæ, longissimæ, mucronatæ: *vaginæ* nullæ. *Spicæ fœmineæ*, Alopecuri v. Phlei quibusdam non parùm absimiles, erectæ, crassiusculæ, teretes, æquales, obtusæ, glauco-virentes, unciam sive nunc

nunc sesquiunciam longæ, brevissimè pedunculatæ ; *masculæ* solitariæ, terminales, brevissimè pedunculatæ, fœmineis paulò breviores. *Glumæ fœmineæ* ellipticæ aut lanceolatæ, acuminatæ, virentes, margine albidæ, acumine scabro ; *masculinæ* fœmineis omnino similes, nisi quod illæ sunt longiores, magìs scariosæ ac pallentes. *Arilli* lanceolati, virides, adpressi, læves, glumis longiores, apice truncati et emarginati.

XVII. *An Account of some rare West Indian Crustacea. By the Rev. Lansdown Guilding, B.A. F.L.S.*

Read December 16, 1823.

Among the numerous crustaceous animals which inhabit the Caribean sea, none perhaps are more worthy of attention than the species which are the subjects of this paper. Several of them are found in the deepest water, and have not hitherto been noticed.

CRUSTACEA.

DECAPODA.

BRACHYURA.

Homola. *Leach Zool. Misc.*

1. *Homola spinipes.* ♀.

H. rubescens, testâ totâ femoribusque spinosis hirsutis, pedibus anticis majoribus spinosissimis: digitis nigris.

Habitat in profundis maris Caribei, semel obvia. *Homolâ spinifronte* paulo major.

Desc. *Spinæ* pedum anticorum aciculares, testæ validæ: femora postica gracilia, interne quadrispinosa.

This specimen was taken from the throat of a large fish, and had lost the left fore-leg. Leach, who instituted the genus for the reception of *H. spinifrons*, possessed only an imperfect subject;

ject; and it is therefore necessary to make the following addition to his generic character:

Antennæ externæ infra oculos insertæ, longitudine corporis, filiformes, articulis duobus basilaribus valde elongatis, primo crassiore, secundo apice recurvo setigero.

MACROPODIA. *Leach Zool. Misc.*

Macropus. *Latr.*
Inachus. *Fabr.*
Maja. *Bosc.*
Cancer. *Penn.*, *Herbst.*

1. *Macropodia occidentalis.*

M. olivacea tota hirsuta, antennis setigeris rostro longioribus, collo tumido, unguibus interne spinosis.

Habitat in mari Caribeo satis frequens, ubi corpus pedesque fucis spongiisque tegens prædam expectat.

Mas magnitudine *M. Phalangii*: Fœm. minor.

LEPTOPODIA. *Leach Zool. Misc.*

Inachus. *Fabr.*
Maja. *Latr.*, *Bosc.*
Cancer. *Herbst.*

1. *Leptopodia ornata.*

L. rufescens, testâ utrinque lineis octo longitudinalibus sanguineis antice coalescentibus *maris* pedibus 2 anticis scabris, digitis purpureis: posticis 8 antice spinosis.

Habitat rarissime in mari insulam S^ti^ Vincentii alluente, *L. sagittariâ* duplo major.

DESC. *Testa* pone oculos utrinque unispinosa rostro serrato. *Maris* venter scaber: *pedes* 2 *antici* majores. *Feminæ pedes*

pedes antici graciles, breves, læves, digitis hirsutis: *cauda* articulo ultimo maximo latissimo.

The male of the only species at present known is tolerably well figured and described in the *Zoological Miscellany* of my much esteemed friend Dr. Leach. Fabricius seems to have suspected *Pactolus Boscii*, or some similar crab, to have been the female of *L. sagittaria*. I possess both sexes of the new species here described, and am therefore able to correct his error. It is necessary to make the following correction of Leach's generic character.

Cauda maris 6-articulata: *feminæ* 5-articulata, articulo ultimo fere magnitudine corporis (quod mirum), reliquis minutis.

MACROURA.

SCYLLARUS. *Fabr., Latr.* Cancer. *Linn.*

1. *Scyllarus carinatus.*

S. rufescente-vitreus, lateribus obscure crenatis, testâ caudâque carinatis.

Habitat in mari Caribeo: post procellam terribilem in littus ejectum marem pedibus duobus posticis simplicibus semel detexi.

Longitudo corporis 2 un.

DESC. *Testa* lata: *cauda* angusta.

2. *Scyllarus æquinoctialis.* Fabr. Suppl.

S. scaber, thorace antennarumque squamis rotundatis crenatis. *Browne Jam. tab.* xli. *f.* 1. *p.* 424.

Habitat rarior in Caribeo mari, edulis.

DESC. *Fœm. Corpus* flavo-rubescens ferrugineo varium. *Testa* quadrata.

quadrata. *Oculi* flavescentes striati. *Cauda* lata, articulo basilari flavescente maculis tribus brunneis, medio bilobato. *Venter* pedesque ferrugineo maculati, unguibus brunneis. *Pedes* 2 postici didactyli ad basin spinâ validâ bifidâ: *antennæ* internæ purpurascentes.

The species of this genus are involved in great confusion from the imperfect and concise descriptions of naturalists. I have thought proper, therefore, to lay down the specific characters of the last-mentioned crab from a living specimen. It was formerly confounded with *S. arctus*, from which Fabricius in his Supplement very properly separated it. The figure of Browne is tolerably correct, but being taken from a male specimen, the two posterior feet are represented as simple. On the basilar segment of the tail beneath are two oblong approximate shelly plates, the use of which is unknown.

Ibacus. *Leach Zool. Misc.*

1. *Ibacus ciliatus.*

I. nigro-flavescens purpureo varius, corpore verrucoso: verrucis ciliatis, testâ utrinque ante fissuram 2-dentatâ postice 6-dentatâ.

Habitat in Caribeo mari rarissimus.

Desc. *Antennæ* externæ profunde ciliato-serratæ, internæ flavescentes purpureo-lineatæ: *pedipalpi* externi articulo primo et secundo cristâ duplici dentatâ. *Pedes* 2 postici ad basin spinâ validâ simplici.

Atya.

ATYA. *Leach Zool. Misc.*

1. *Atya scabra.*

Atys scaber. *Leach in Linn. Trans.* ii. *p.* 345.

I have only introduced this genus to take notice of the *habitat* of the species which was found unmarked in the British Museum, and which stands as the type. It occurs in incredible numbers in the mountain streams of this island in company with *Palæmon Carcinus*, where they are caught by the Negroes in baskets for the market.

St. Vincent, August 1, 1823.

XVIII. *Ob-*

XVIII. *Observations on some of the Terrestrial Mollusca of the West Indies. By the Rev. Lansdown Guilding, B.A. F.L.S.*

Read December 16, 1823.

HAVING for many years been diligently employed in investigating the *Mollusca* of the Antilles and Caribean Sea, I hope at a future period to have the happiness of presenting a systematic arrangement of them to the Linnean Society. I shall at present notice a few of the terrestrial species found in this island, the shells only of which are known. It will be seen that one of them, from ignorance of the animal, has been referred by Dr. Leach to a genus in which it cannot possibly remain. This naturalist has placed it in the genus *Carychium* of Müller, which possesses only two tentacula.

St. Vincent, September 2, 1823.

MOLLUSCA.

GASTEROPODA.

HELICINA. *Lamarck.*

Characteri generico apud Lamarckium hæc pauca addenda: "Tentacula duo setiformia; oculis radicalibus."

1. *Helicina fasciata.*

H. corpore livido, dorso tentaculisque atris, oculis prominulis.

Testa flavescens, rufo-varia: labiis margineque albentibus: anfractibus sex: operculo brunneo.

Lister tab. 74. *f.* 73? *Edit. Huddesford*: figura rudis.

Lamarck Anim. sans Vertèbres vi. 2. *p.* 103.

Diam. 7 lin.

Habitat ubique in montibus sylvosis S^{ti} Vincentii.

BULIMUS. *Scopoli, Bruguières, Lamarck.*

Char. Gen. *Leach Zool. Miscel. v.* i. *p.* 67.

1. *Bulimus hæmastomus.*

B. corpore olivaceo-nigro, corrugato: pede subtus pallido: capite bifariam crenato.

Testa sordida valida: anfractibus sex obliquè striatis: labiis roseis.

Bulimus hæmastomus. *Lamarck Anim. sans Vert.* vi. 2. *p.* 117.

Exempla juniora diu tenera subdiaphana epidermide fuscâ tecta, mox maturescentia epidermide remotâ pallescunt. Ova nivea, corrosa, prægrandia, ovali-elliptica; crustâ calcareâ, vitello vitreo.

Long. 13 lin. Lat. 9 lin.

Habitat in dumetis Antillarum, hic et illic satis frequens.

BULIMULUS. *Leach.* Bulimus. *Lamarck.*

Characteri generico in *Zool. Miscel. tom.* i. *p.* 41. hæc pauca addenda: "Tentacula 4. duo superiora longa oculis terminalibus: operculum nullum." A *Bulimo* differt hocce genus labio externo tenero.

1. *Bulimulus stramineus.*

B. corpore cærulescente-flavido, corrugato: pede subtus pallido: tentaculis apice saturatioribus, oculis nigris.

Testa

Testa tenera, tota straminea, transversè obscuro-densè striata: anfractibus sex.

Habitat abundè in dumetis S^{ti} Vincentii.

Incolâ retractâ (coloribus confusis) virescit testa.

CAPRELLA. Carychium. *Leach.* Auricula. *Lam.*

Char. Gen.

Testa dextera "ovalis, spiralis, spirâ elevato-obtusâ: anfractibus duobus ultimis maximis: os integrum elongatum: labium internum uniplicatum, infra medium cavernoso-inflexum: externum incrassatum marginatum."

Animal tentaculis quatuor cylindricis: duobus superioribus longis: oculis terminalibus.

1. *Caprella undulata.*

C. corpore olivaceo-nigro, corrugato: pede subtus pallido: tentaculis nigris apice albentibus: capite emarginato.

Testa valida, anfractibus quinque, basilari nunc flavescente, nunc ferrugineo, fasciis brunneis obliquis undulosis: superis saturatioribus, elevato-undulatis: ore albo.

Carychium undulatum. *Leach Zool. Miscel.* i. *p.* 83. *t.* 37.

Auricula Caprella. *Lamarck Anim. sans Vert.* vi. *p.* 2. 140.

Habitat ubique in montibus sylvosis S^{ti} Vincentii truncis ramisque obvia.

Epidermis rugosa, nunc glauca nunc fusca. Pullus labiis simplicibus. Sæpe (quod mirum) testam viventis profundè corrosam vidimus.

XIX. *Descriptions of two new Species of Erythrina. By Felix de Avellar Brotero, Professor of Botany at Coimbra, F.M.L S.*

Read June 3, 1823; *and March* 16, 1824.

ERYTHRINA POIANTHES.

Er. foliis ternatis, foliolis lateralibus ovatis, intermedio rhombeo-ovato, omnibus subtus pubescentibus, rhachi petioloque communi aculeatis; caule arboreo, aculeato; calyce obliquè truncato, latere superiori vel fisso vel integro; staminibus diadelphis, vexillo vix brevioribus.

Tab. X. XI.

Radix horizontaliter protensa, ramosa, lignosa; ligno albido, levi, cortice ex viridi fusco.

Caulis arboreus, decem ad quindecim pedes, et ultrà, altus, teres, glaber, infernè sæpe inermis, supernè aculeatus, ramosus; ramis alternis, erectis, aculeatis; aculeis sparsis, horizontalibus, infernè subcoccineis, apicibus fuscis.

Folia annua, alterna, patentia, ternata, petiolata; foliolis integerrimis, utrinque viridibus, subtus in rhachi aculeatis pubescentibusque, nervoso-venosis, suprà glabris; duobus lateralibus oppositis ovatis, obtusiusculis, tres ad sex uncias longis, duas ad quatuor in basi latis, semilamina eorum externa latiori; intermedio, seu impari, rhombeo-ovato, lateralibus undique maiori. *Petiolus* communis basi crassiori articulatus, ibique duabus stipulis sessilibus, subpubescentibus, obtusis, nervosis, cultratis, stipatus, glaber, teres,

teres, fistulosus, subtus aculeatus, quinque ad duodecim uncias longus, sesquiunciam ad uncias duas ultra duos laterales protensus; laterales communi articulati, subteretes, subpubescentes, suprà canaliculati, quatuor lineas longi, uterque sub articulo uniglandulosus; terminalis lateralibus, tam longitudine quàm crassitudine, omnino similis, apici communis protensi articulatus, ibique duabus glandulis sessilibus, subrotundis, truncatis, cavis et quasi cyathiformibus, instructus.

Florescentia ante foliorum eruptionem, racemosa; racemi rarò solitarii, sæpe duo tresve ex gemmis floralibus ad latera gemmæ foliaceæ ramos aculeatos terminantibus exorti, pyramidati, pedunculati. *Pedunculus* communis arcuato-assurgens, teres, inermis, glaber, intùs medullosus, extùs saturatè viridis, vel ex viridi coccineus, duas, tres seu quatuor uncias usque ad imos flores longus, tres quatuorve lineas infernè crassus. *Racemi* rhachis erecta, subteres, coccinea lanugine tecta, quatuor ad septem uncias longa, sensim versus apicem attenuatior, numerosis, ad centum et ultrà, onusta floribus approximatis, quamplurimis deciduis, omnibus in Lusitania abortivis, superioribus inapertis erectis subsessilibus, inferioribus apertis nutantibus aut pendulis, ex eodem puncto sæpe ternis, paucis binis, pedicellatis. *Pedicelli* teretes, lanugine coccinea tecti, basi et apice sub calyce articulati, decidui, in floribus imis duas ad tres lineas longi nutantesque, in aliis sensim breviores, erecti, omnes ad basin bracteis involucrati. *Involucri* bracteæ setaceæ, lanugine coccinea tectæ, caducæ, sæpe quatuor, tres sub tribus pedicellis minimæ, lineam ad sesquilineam longæ, quarta his supposita longior, pedicellis æqualis, aut ipsis paulo altior: sub calyce duæ quoque bracteæ minimæ, tribus illis pedicellorum simillimæ, sed lanuginosiores, sunt.

Perianthium

Perianthium monophyllum, compressiusculum, tubuloso-subcampanulatum, ex fusco coccineum, subpubescens, quinque sexve lineas longum, basi obtusum, fundo carnoso ad sesquilineam crasso, receptaculum fructificationis constituente, ore obliquate truncato, edentulo, labio superiore nullo, margine sæpe indiviso, interdum spathæformiter duas ad tres lineas scisso, inferiori protenso, acutiusculo, sub apice mucronato.

Corolla papilionacea, pentapetala, inodora. *Vexillum* longissimum, ferè conduplicatum, lateribus concavo-convexis strictè conniventibus, dorso carinatum sursumque leviter arcuatum, apice acutiusculum, basi ungue minimo albido instructum, extùs saturatè coccineum, intùs obsoletè striatum, dilutè coccineum seu subroseum, utrinque glabrum: ex industria apertum elliptico-lanceolatum, duas uncias longum, septem lineas in medio latum, apice vix ac ne vix emarginatum.

Alæ calyce inclusæ, illoque valde breviores, dilutissimè coccineæ, seu ferè roseæ, subsessiles, glabræ, obtusæ, ovato-oblongæ, seu subcultratæ.

Carina dipetala; petalis subsessilibus, rectis, oblongis, seu lineari-lanceolatis, obtusis cum brevissimo acumine, dilute coccineis, infernè quasi roseis, vexillo dimidio ferè brevioribus, duas lineas cum dimidio in medio latis.

Stam. filamenta decem, diadelpha; novem inferiora, e medio usque ad receptaculum coalita, canalem cylindraceum supernè longitudinaliter dehiscentem, circa glandulam annularem mellifluam gibbosum lateque hiantem, efficientia, e medio autem usque ad apicem soluta, eorum quinque crassiora, longiora, vexilli ferè longitudine, illoque tecta, quatuor alia paulo breviora; decimum superius distinctum, inferioribus longioribus paulo brevius, germini incumbens, rimamque canalis cylindracei tegens. *Antheræ* incumbentes,

tes, croceæ, ovato-oblongæ, biloculares, apice obtusæ, leviterque emarginatæ; polline globoso, hyalino.

Pist. germen oblongum, lineari-lanceolatum, compressum, subtorulosum, intra canalem staminum inclusum, subpubescens, supernè ubi stamen distinctum ipsi incumbit subcanaliculatum, infernè pedicellatum. *Pedicellus* albidus, glaber, filiformis, quatuor quinqueve lineas longus, receptaculi centro crasso insertus, ibique glandula nectarifera annuliformi oblique et inæqualiter septemcrenata cinctus. *Stylus* subulatus, compressus, glabriusculus, ex albido viridis, staminibus altioribus æqualis aut paulo longior. *Stigma*: punctum ovatum, acutum, album, erectum, ante verò anthesin recurvum.

Pericarpium (ex germine) legumen longum, ad semina torulosum, acuminatum, uniloculare, polyspermum. In Lusitania deciduum, abortans.

Semina (ex germine) quatuordecim ad octodecim reniformia.

Colitur in Horto Botanico Olisiponensi ad Aulam Regiam in Ajuda sito, et alibi in Lusitania, ubi floret Januario ad Martium. Unde indigena incertum; etsi a nonnullis potius ex Asia quam ex America et Africa in Lusitaniam evectam esse existimetur.

Obs. 1°. Pubescentia et aculei tam petiolis, quàm laminis foliorum, in adulta arbore interdum desunt; caulis quoque infernè sæpe inermis.

Obs. 2°. Non confundenda cum *E. corallodendro, indicâ et pictâ*, quibus affinis, differt enim maximè staminibus verè diadelphis: prætereà diversa a *Corallodendro* calyce edentulo, foliolis subtus aculeatis et pubescentibus: ab *Indicâ* eisdem foliolis subtus aculeatis atque pubescentibus, staminibus vexillo non longioribus: item a *pictâ* (*Willd.*) foliorum forma, colore, et pubescentia, tum petiolo terminali biglanduloso.

Obs. 3°. Tam in hac specie, quàm in aliis ejusdem generis, quas

quas mihi observasse contigit, nullus porus melliferus in basi perianthii, sive externè sive internè, mihi unquam visus est; nisi pro illo sumatur glandula in fundo calycis carnoso sita nectarifera, annulæformis, quæ germinis pedicellum cingit. Hæ notæ constantes sunt, et insimul cum illis vexilli meliorem, quam calyx et legumen characterem *Erythrinæ* essentialem, constituunt, qui sic emendandus :— Vexillum prælongum; nectarium glandula annulæformis, germinis pedicellum cingens.

Butea et *Rudolphia* (Willd.) *Erythrinarum* veræ congeneres sunt, et nonnisi sectione separabiles; quare ad illas iterum amandandæ.

ERYTHRINA secundiflora.

Er. foliis ternatis: foliolis ovatis, subacuminatis, utrinque glabris, petioloque inermibus; caule arboreo aculeato; calyce inaperto obsoletè denticulato, posteà edentulo, truncato, variè scisso; staminibus diadelphis, vexilli longitudine; carinâ alis æquali, utrisque calyce longioribus, vexillo autem fere triplo brevioribus.

Tab. XII.

Radix horizontaliter protensa, ramosa, lignosa; ligno exalbido, levi, molliculo, inodoro, cortice ex viridi fusco.

Caulis arboreus, viginti et ultra pedes altus, teres, glaber, ex viridi albidus, infernè sæpe inermis, supernè aculeatus, ramosus; ramis alternis, erectis infernè nudifoliis, superne foliatis, permultisque brevibus ramulis approximatis terminatis, omnibus aculeatis; aculeis sparsis, brevibus, horizontalibus, nigricantibus.

Folia annua, ramulorum tantummodo extremitates exornantia, alterna, approximata, patentia, seu erecto-patula, ternata, petiolata; foliolis integerrimis, utrinque inermibus, nervoso-venosis, utrinque viridibus, glabrisque cùm adultis, subpubescentibus verò dum recèns e gemma ortis; duobus lateralibus

ralibus oppositis, ovatis, rarò vix rhombeis, acuminatis, tres ad quinque uncias longis, duas ad tres latis, semilaminis eorum æqualibus, rarò externâ vix latiori; intermedio, seu impari, lateralibus formâ simili, aut interdum ovato-subcordato, ipsis tamen undique majori.

Petiolus communis ramulo articulatus, ibique crassior, duabusque stipulis sessilibus, subcultratis, obtusiusculis, pubescentibus, tres lineas longis, caducis stipatus, inermis, glaber, fistulatus, subtus convexus, suprà canaliculatus, e basi usque ad foliolorum lateralium duos petiolos quinque ad septem uncias longus, ex istis usque ad basin articulatam petioli terminalis folioli sesquiunciam ad uncias duas protensus. Duo laterales inermes, glabri, subtus convexi, suprà canaliculati, quinque sexve lineas longi, uterque communi articulatus, et sub articulatione uniglandulosus; glandulæ sessiles, subrotundæ, truncatæ, caviusculæ. *Petiolus* terminalis lateralibus tam formâ quàm longitudine cæterisque omnino similis, apici communis protensi articulatus, ibique duabus glandulis illarum simillimis, quæ sub petiolis lateralibus sunt, instructus.

Florescentia insimul cum eruptis foliis, rarò paulò antea, racemosa. *Racemi* perpauculi, sæpe solitarii, interdum duo, ex gemmis floralibus ad latera gemmæ foliaceæ, quæ ramulos aculeatos terminat, exorti, pedunculati. *Pedunculus* communis teres, inermis, glaber, saturate viridis, seu ex viridi coccineus, medullosus, erecto-patulus, duas ad quatuor uncias e basi usque ad imos flores longus, duas tresve lineas infernè crassus. *Racemus* simplex; rachis subteres, sensim versus apicem cernua, lanugine subcoccinea tecta, tres ad quinque uncias longa, floribus quamplurimis approximatis, nutantibus, secundis, pedicellatis, inferioribus sæpe caducis, instructa. *Pedicelli* undique ex eodem puncto

sæpissime terni, perpauculi bini, teretes, lanugine coccinea tecti, basi et apice sub calyce articulati, duas tresve lineas longi, omnes ad basin bracteis involucrati, decidui. *Involucri* bracteæ setaceæ, pube saturate coccineâ subtectæ, caducæ, sæpe quatuor, quarum tres sub tribus pedicellis minimæ, lineam ad sesquilineam longæ, quarta his supposita longior, pedicellis æqualis, aut paulo ipsis longior: sunt quoque sub calyce duæ tresve minimæ bracteæ, tribus illis, quæ sub pedicellis, simillimæ, at lanuginosiores.

Perianthium monophyllum, tubulosum, membranaceum, ex rubro virens, subpubescens, novem lineas longum, basi obtusum, fundo carnoso ad sesquilineam crasso, receptaculum fructificationis constituente. Ante anthesin sensim versus apicem constringitur, ibique acutulum devenit, ore clauso, obsoletè denticulato, dentibus tribus ad quinque inæqualibus. In anthesi sæpe a carinâ staminibusque deorsum protruditur, spathæformiter infernè scinditur, supernè autem corollæ vexillo incumbit; interdum tamen prope medium oblique aut horizontaliter scinditur, tunc ejus pars superior, quasi cucullus, vexilli apicem, usque dum ex ipso desiliat, aliquandiu tegit, inferior autem penitus indivisa atque edentula corollam persistenter cingit.

Corolla papilionacea, pentapetala, inodora. *Vexillum* tàm latitudine quàm altitudine amplum, ferè conduplicatum, lateribus concavo-convexis conniventibusque, dorso obtusum, adscendens seu sursum leviter arcuatum, apice acutiusculum, sicque quasi acinaciforme, ungue albido parvo instructum, extus coccineum, intus ex flavo coccineum, utrinque glabrum, atque ex nervoso venosum: ex industria apertum obovatum, novemdecim ad viginti tres lineas longum, undecim ad tredecim in medio latum, apice obtusum, vix ac ne vix mucronatum.

Alæ

Alæ e calyce exclusæ, carinæ incumbentes, ipsius longitudine, aut vix breviores, oblongæ, obtusæ, subarcuatæ, subcultratæ, breviter unguiculatæ, glabræ, extus dilutissimè coccineæ, apicis margine interdum saturatè purpureæ, intus pallidæ, nervoso-venosæ.

Carina deorsum obliquata, obtusa, emarginata, obovato-subrotunda, connato-dipetala; petalis in medio coalitis, ad basin et prope apicem solutis, oblongis, obtusis, vix unguiculatis, ex viridi flavescentibus, apicis lineâ marginali interdum purpureis, nervoso-venosis, duodecim lineas longis, calyce longioribus, vexillo autem dimidio brevioribus.

Stam. filamenta decem, diadelpha; novem infernè, paulo infrà apicem, coalita usque ad receptaculum, albida, cylindracea, longitudinaliter sursum dehiscentia, basi gibbosa, ibique glandulæ annulari nectariferæ intus adhærentia; supernè autem usque ad apicem soluta, purpurascentia, eorum quinque longiora, vexilli longitudine, rarò vix paulo plùs, sub ipso primitùs recondita, demum declinata: decimum simplex, superius, germini impositum, inferioribus brevius, eorum canalis cylindracei rimam arcte obstruens, ipsi tamen rimæ nec adhærens nec coalescens, sed tantummodo constricte incumbens, basi autem late utrinque seceditur, sicque facilem utrinque exitum melli præbet. *Antheræ* incumbentes, virides, aut ex viridi purpureæ, oblongiusculæ, biloculares, utrinque obtusæ, leviterque emarginatæ; pol line globoso, hyalino.

Pist.: *Germen* oblongum, lineari-lanceolatum, compressum, subtorulosum, subpubescens, intra canalem staminum omninò ferè inclusum, suprà, ubi tamen distinctum incumbit, longitudinaliter subcanaliculatum, basi pedicellatum. *Pedicellus* filiformis, ex albido viridis, quatuor quinqueve lineas longus, receptaculi centro insertus, ibique glandulâ annuliformi

liformi nectariferâ, profundè striatâ, ex novem glandulis minimis fulvis lateraliter adhæsis compositâ, cinctus. *Stylus* subulatus, compressus, subarcuatus, glabriusculus, ex albido viridis, staminibus altioribus longior. *Stigma* punctum flavum, subglobosum, submucronatum.

Pericarpium (ex Germine) legumen pedicellatum, longum, ad semina torulosum, acuminatum, uniloculare, polyspermum : in Lusitania abortans, deciduum. *Semina* (ex Germine) octo, aut novem, reniformia.

Colitur in Horto Regio Olisiponensi, ad Aulam Regiam in Ajuda sito, et alibi in Lusitania, ubi Martio Aprilique floret. Indigenam e Brasilia esse fertur. Arbor cortice, ligno, floribus, fructibusque insipida et inodora.

Obs. 1. Non confundenda cum *Er. Corallodendro*, ut sæpe a Lusitanis fit, qui eam *Arvore do Coral* appellant, nam ab illa differt foliorum lateralibus foliolis ovatis acuminatis, racemi floribus secundis, calyce ferè horizontaliter aut spathæformiter scisso, staminibus diadelphis, vexilli forma atque latitudine ampla.

Obs. 2. Glandula nectarifera annuliformis, seu si potius velis annulus glandulosus nectariferus, in hac specie canalis cylindracei basi gibbosæ intus adhæret.

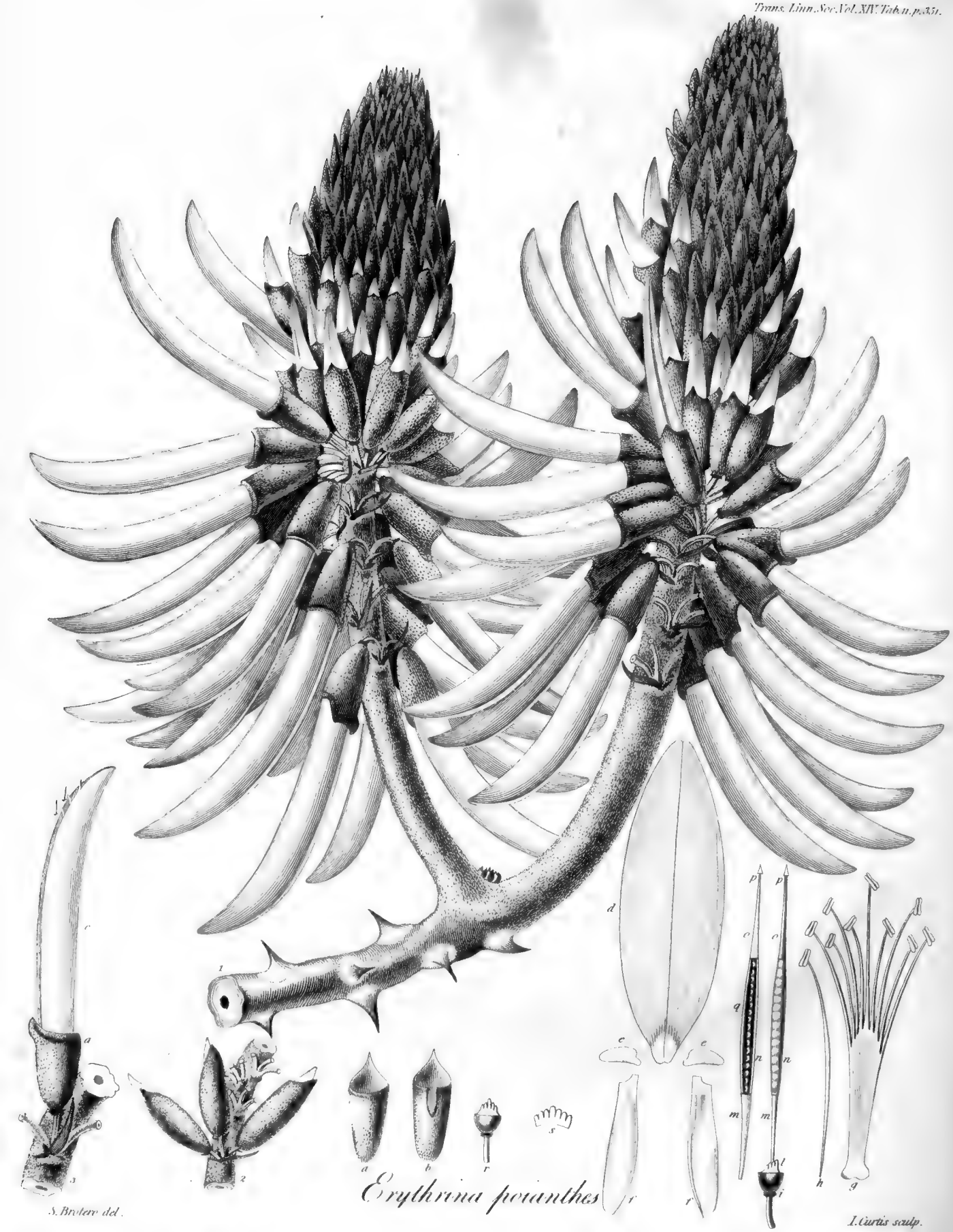
EXPLI-

Erythrina poianthes.

S. Brotero del.

I. Curtis sculp.

Trans. Linn. Soc. Vol. XIV. Tab. II. p. 351.



Erythrina poiianthes

S. Brotero del.

I. Curtis sculp.

EXPLICATIO TABULARUM.

ERYTHRINA POIANTHES.

TAB. X.

Ramulus cum foliis, et eorum aculeis. (*a a*). Stipulæ. (*b b*). Petioli laterales, et glandulæ duæ singula sub singulo petiolo. (*c*). Glandulæ duæ ad articulum petioli terminalis.

TAB. XI.

Fig. 1. Ramulus ad gemmæ foliaceæ latera duobus racemis terminatus.

Fig. 2. Racemi rhachis in ejus extremitate dissecta cum tribus floribus inapertis, pedicellis tribus, quatuorque bracteis ex eodem puncto exortis, insuper duabus aliis minimis bracteis vix conspicuis sub calyce sitis.

Fig. 3. Ejusdem rhachis frustulum in ima racemi parte dissectæ cum eisdem bracteis et pedicellis tribus, quorum intermedius florem perfecte evolutum sustinet.

(*a a*). Calyx tàm a fronte quàm a latere visus, ore indiviso, ut sæpe occurrit.

(*b*). Idem ore quasi spathæformiter scisso.

(*c*). Vexillum corollæ quasi conduplicatum, petala alia et fructificationis partes, paucis antheris exceptis, penitus celans.

(*d*). Idem de industria expansum.

(*e e*). Alæ. (*f f*). Duo carinæ petala.

(*g*). Filamenta novem inferiora, infra medium coalita, exinde distincta, et antheris terminata.

(*h*). Filamentum decimum superius distinctum.

(*i*). Pars carnosa calycis cum nectario et pistillo.

(*l*). Glandula annularis nectarifera germinis pedicellum cingens.

(*m m*). Germinis pedicellus.

(*n*). Germen subtorulosum: (*o o*). Stylus: (*p p.*) Stigma.

(*q*). Germen unâ ex duabus valvulis de industria spoliatum, ut seminum forma numerusque in conspectum veniant.

(*r*). Calycis fundus carnosus cum glandula annulari nectarifera septemdentata.

(*s*). Eadem e calyce avulsa, lateraliter scissa et expansa.

ERYTHRINA secundiflora.

Tab. XII.

Fig. 1. Ramulus aculeatus cum foliis et racemis. (*a*). Stipulæ ad petioli communis basin. (*b*). Petiolus communis et laterales cum glandulis sub istorum basi. (*c*). Racemi duo, quorum in vegetiori flores secundi, nutantes. (*d*). Pedicelli bracteis involucrati. (*e*). Pars calycis superior (cùm iste horizontaliter scinditur) vexilli apicem quasi cucullus aliquandiu tegens.

Fig. 2. Flores tres, quorum calyces basi bracteati et nondum aperti sunt, insimul cum suis pedicellis eidem rhachis puncto adhæsis, et ibi involucratis.

Fig. 3. Calyx horizontaliter scissus, superiori parte cuculliformi, apice obsoletè denticulato.

Fig. 4. Calyx spathæformiter scissus.

Fig. 5. Flos in plena sua solita apertione.

Fig. 6. Vexillum ex industria apertum.

Fig. 7. 7. Alæ.

Fig. 8. Carina.

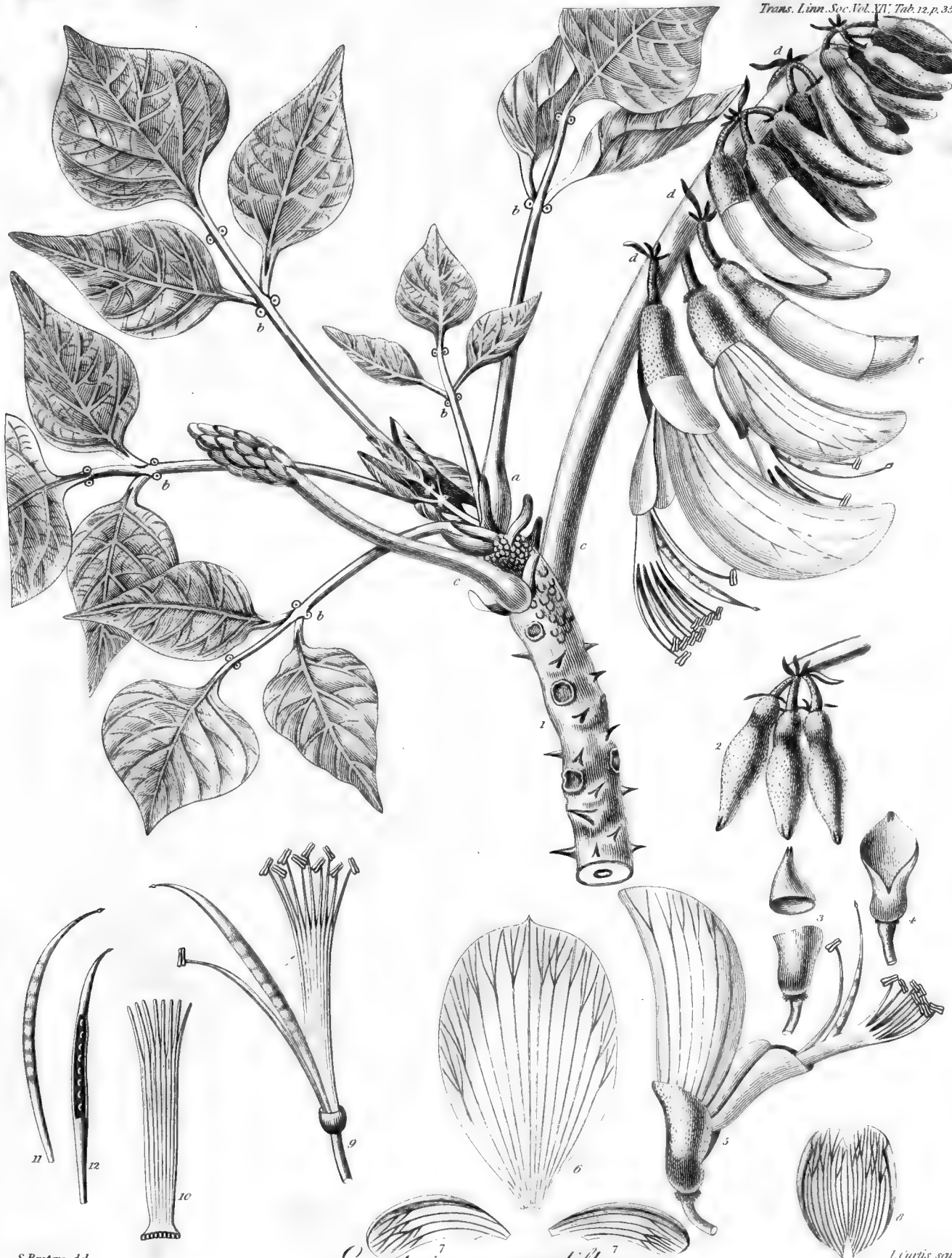
Fig. 9. Stamina diadelpha, et Pistillum, calyce corollaque nudata, et receptaculo inhærentia.

Fig. 10. Canalis staminum absque antheris ex industria distensus, basi gibbosâ, glandulæ annuliformi, nectariferæ intus adhærens.

Fig. 11. Pistillum a receptaculo separatum, basi pedicellatum.

Fig. 12. Legumen (ut adhuc Germen pistilli) partim ex industria evalvatum, ut seminum forma numerusque conspiciantur.

Trans. Linn. Soc. Vol. XV. Tab. 12. p. 352.



S. Brotero del.

Erythrina secundiflora

J. Curtis sculp.

XX. *On the Insect called Oistros by the Ancient Greeks, and Asilus by the Romans. By William Sharp MacLeay, Esq., M.A. F.L.S. Communicated by the Zoological Club of the Linnean Society.*

Read March 16, 1824.

The determination of the animals and plants mentioned by the ancient writers must always be a pleasing subject of research, tending, as it does, not merely to our better comprehension of the meaning of these authors, but also to our better acquaintance with the mysteries of nature. Every classical reader, as well as every entomologist, is familiar with the word *Oestrus* as the name of one of the most celebrated insects of antiquity. The insect itself, however,

" cui nomen *Asilo*
" Romanum est, *Œstron* Graii vertere vocantes,"
VIRG. Georg. iii. 147.

has not for this been the more accurately determined; and Olivier is the first modern naturalist who appears to have suspected that the *Œstrus* of the ancients and the *Œstrus* of the moderns are totally different insects. With an exception in favour of Messrs. Latreille, Kirby and Spence, this curious remark seems not to have excited much attention; although it may easily be proved, that Olivier has come much nearer the truth than those who hold the contrary opinion.

In investigations of the following nature, it is not only advantageous but necessary to begin from some fixed and indisputable position. Now such I take to be the identity of the insects termed in French *taon*; in Spanish *tavano*; in Italian *tabano*; and

and in Latin *tabanus*. The *tabani* are unfortunately insects too common for their name to have ever been forgotten; and knowing what the country people in France call *taons*, we know the insects which Pliny anciently termed *tabani*. By comparing Pliny with Aristotle, we find that he invariably translates the word μύωψ (*cæcutiens*) by the Latin word *tabanus*; and entomologists know well that this Greek name is extremely appropriate to the modern *tabani* or *taons*, which are so remarkable for their eyes, that a common species of *Chrysops* has at the present day the trivial epithet of *cæcutiens*. Now it appears from Aristotle, that the οἶστρος* and μύωψ were insects extremely near each other in affinity; they are almost always mentioned by him together, and agree in every respect but that wherein Aristotle was least likely to be accurate, namely, their mode of generation. In description they always accord; they are both *diptera*, and therefore he says necessarily ἐμπροσθόκεντρα, "οὐδὲν δ' ἔστι δίπτερον ὀπισθόκεντρον." Now this, by the way, proves not only that the οἶστρος was not the modern *Œstrus*, but moreover that Aristotle could never have seen a modern *Œstrus* attack cattle; for had he seen it, he would most assuredly have deemed it ὀπισθόκεντρος. And yet he must have seen his οἶστρος about cattle; for he states positively not only that the οἰστροῖ pierce the hides of quadrupeds, but that they are armed with a strong tongue, and are blood-suckers (ἀιμοβόρα ζῶα). In both these last respects it is to be observed, that they differ totally from the modern *Œstrus*, but perfectly agree, as M. Latreille has well said, with the Linnæan *Tabani*.

Ælian describes the οἶστρος and μύωψ in the same way as Aristotle. They are both most inimical to cattle (βουσὶν ἔχθιστα). The οἶστρος he states to be one of the largest flies (κατὰ τὰς μυΐας τὰς μεγίστας), having a strong sting in its mouth, and uttering a

* Οἶστρος is a name also applied by Aristotle to some small insectivorous bird, and to some species of the *Cymothoadæ*, which is parasitical about the fins of the Tunny. Pliny also appears to apply the word *Œstrus* to the drone (lib. ii. c. 16.).

particular

particular kind of harsh humming noise (ἦχον βομβώδη τινὰ καὶ τραχύν). The μύωψ, on the other hand, he says is like the fly called by the Greeks κυνόμυια; and although it makes a louder hum than the οἶστρος, he states that it has a smaller sting.

If we now turn to the poets, we shall find that their account of this insect tallies perfectly with the above description of the ancient naturalists, but not at all with the modern genus *Œstrus*.

Homer describes his *Œstrus* as ἀιόλος, a word which applies admirably to the most common of all *Tabanidæ*, namely the *Tabanus pluvialis* of Linnæus, as well as to the insects which now form the genus *Chrysops*. And the Scholiast, after stating that the οἶστρος and μύωψ are very near in affinity, says that the latter differs in having a smaller sting in the mouth, and in being subæneous in respect to its aspect or *facies* (ὑπόχαλκον τὴν μορφὴν), thus evidently pointing, as I think, to the difference which exists between the modern genera *Tabanus* and *Hæmatopota*, the latter having much more splendid eyes. That Homer's insect was not the modern *Œstrus* may besides be inferred from what he says of the season in which it makes its appearance,

"Ὥρῃ ἐν εἰαρινῇ, ὅτε τ' ἤματα μακρὰ πέλονται·"

for there are few cases, I believe, of the modern *Œstri* appearing earlier than the middle of July. And this circumstance, by the way, leads also to the conclusion, that the English *breese* or *brize* is not the modern *Œstrus*, although it is generally understood so to signify in the following punning lines of Shakespeare:

> " Cleopatra,
> The *breeze* upon her, like a cow in June,
> Hoists sail and flies."

Now Mouffet, who, both as an entomological observer and as a contemporary of Shakespeare, was likely to know the insect then named *brize*, says expressly that the *breeze*, *clegg*, *clingez*

and *taon*, are all the same insect, his description of which proves it to be no other than the *Hæmatopota pluvialis*, for which the *Clegg* remains to this day the well-known and appropriate provincial name—a name totally inapplicable to the modern *Œstrus*.

I have before said, that Aristotle makes it quite evident that his οἶστρος and μύωψ were very nearly of the same construction. So near indeed in affinity do they appear to have been, that Æschylus would seem to consider them as identical in his *Prometheus vinctus*. From this poet we learn, that they are ὀξύστομοι, and pierce the skin. Io says,

" Οἰστρήλατῳ δὲ δέγματι δειλαίαν
Παράκοπον ὧδε τείρεις;"

In short, wherever the μύωψ is distinguished from the οἶστρος, I take the former to be either a *Chrysops* or *Hæmatopota**, or some insect near to them, and the latter to be some species of the modern genus *Tabanus*, probably the *Tabanus bovinus* Linn. or dun-fly, whose power of agitating cattle I have myself had occasion to witness. This last insect certainly appears to be the *Asilus* and *Œstrus* of Virgil. That this poet's insect cannot be identical with any modern *Œstrus* is clear from his describing it to be in great plenty, and to be " acerba sonans." Now the *Œstrus bovis* is very rare every where; and, according to Mr. B. Clark, makes no noise. The *Œstrus equi* is also silent in flying, as I have repeatedly myself observed. So that neither of these insects can be that which is celebrated by Virgil, whose description of the ability of the ancient οἶστρος to make a particular kind of humming noise is corroborated by the Scholiast before mentioned as well as by Ælian.

* One circumstance which is mentioned by Ælian respecting the *Myops*, namely, that it makes a louder hum than the *Œstrus*, is perhaps against its identity with the modern genus *Hæmatopota*.

Messrs.

Messrs. Kirby and Spence in their *Introduction to Entomology* think that the ancient *Myops* was some species of Latreille's genus *Tabanus*, and that the *Œstrus* of the Greeks may either have been a *Pangonia* or a *Nemestrina*. What we know, however, of the latter genus answers in no one respect to the description above given of the ancient *Œstrus*, which certainly was an insect allied to the modern *Tabanus*; whereas *Nemestrina* has no immediate connexion with it either in economy or structure. Besides, no *Nemestrina* has ever yet been found in Europe. The argument for *Pangonia* is rather stronger, as this is not only an European genus, but one nearly allied to *Tabanus*. Aristotle however says, that his *Œstrus* and *Myops* have both a strong tongue (*ἰσχυρὰν γλῶτταν ἔχουσι*); a description in perfect accord with the mouth of a modern *Tabanus*, but quite at variance with the long, weak and flexible proboscis of *Pangonia*, which can scarcely be supposed capable of piercing the hide of an ox. Olivier and Latreille indeed both state, that the long trunk of *Pangonia*, like that of *Bombylius*, only serves for sucking flowers. But to insects that suck flowers Aristotle expressly places his *οἶστρος* in opposition.

It is rather interesting to remark the manner in which the early modern naturalists viewed this subject. Mouffet's opinion is, as far as I can make it out, the same with mine given above. At all events he considers the *μύωψ* of the Greeks to be our *Hæmatopota pluvialis*. Ray, on the other hand, considers this insect to be the *οἶστρος*, as we may judge from the following description, "Musca bipennis Œstrum dicta, alis membranaceis punctis crebris nigrioribus velut adspersis:" which is clearly the *Hæmatopota*.

Valisnieri appears to have been the first naturalist of any repute who took the modern *Œstrus* to be that of Virgil, while Martyn and other commentators seem to have adopted his opinion. The

first insect, which Linnæus considered to be the *Œstrus* of the ancients, appears to have been a species of the modern genus *Asilus*, probably the *Asilus crabroniformis*, as we learn from his *Lachesis Lapponica*. This was a gross error; and he soon rectified it, as he thought, by adopting the opinion of Valisnieri. It is not indeed unlikely that some of the ancients* should, like Valisnieri, have seen the perfect insects of the modern *Œstrus* flying about cattle, and that they should have witnessed the extraordinary agitation which they produce: but however this may be, they certainly appear to have always confounded such insects with the more common *Tabani*; for it is the modern *Tabanus*, or some genus extremely near to it, that they have always described as the οἶστρος.

I shall take this opportunity of quoting a passage from Mouffet, which proves that he was acquainted with the modern genus *Œstrus*, although he did not confound it with the ancient οἶστρος. The passage will also show us how valuable is the information sometimes to be procured from this obsolete work; since, if we connect it with what Reaumur has said of the *Œstrus equi*, we have almost the whole economy of this interesting insect:

" His proximè accedit alia musca bobus et jumentis interdiu sole fervido infesta, quam Pennius *Curvicaudam* sive σκολιουρὸν jure appellat. Semper enim cruribus aut ventri jumenti insidens, caudam versus ipsam recurvam tenet et spiculum exertum quo ad percutiendum cauda sit paratior (δίπτερον ὀπισθόκεντρον).

* Aristotle was not certainly one of these ancients; for he could never have seen a female of the modern *Œstrus*, as appears from his stating that no dipterous insect has its sting placed behind. It seems however to have escaped the notice of naturalists, that this great philosopher was acquainted with, and has described the larva of one of the modern family of *Œstridæ*; and, as is rather singular, precisely that larva which Reaumur describes as infesting the fauces of the stag, but of which the perfect insect remains still unascertained.—See *Arist. Hist. Anim. lib.* ii. *c.* 18; and *Reaum. tom.* v. 67—77.

Hanc

Hanc Angli *a Whame and a Burrell-flye* proprie vocant, nec nisi in Angliâ facile invenitur. Musca hæc api fere similis formâ et colore, sed corpore est crassiore. Non adhæret nec sanguinem sugit sed solummodo stimulo in caudâ pungit, atque ut equos affligat per longissima itinera ipsos volando persequitur. Equi naturâ hanc muscam timent et ad ejus solum contactum quasi horrent, caudâ pedibusque et labiis tam cruentum hostem abigere sæpe conantes. Sunt qui putant hanc muscam non aculeo pungere, sed stercora (*ova*) pilis equi affigere caudâ, unde posteà molestissimæ lendes gignuntur. Magno quidem impetu sed cæco ad prædam *Tabanus* atque Σκολιουρὸς feruntur." *p.* 62.

XXI. *Some Account of a Collection of Arctic Plants formed by Edward Sabine, Esq., F.R.S. and L.S., Captain in the Royal Artillery, during a Voyage in the Polar Seas in the Year* 1823. *By William Jackson Hooker, LL.D. F.R.S. L.S. and H.S. Communicated by the Council of the Horticultural Society of London.*

Read April 6, 1824.

The scientific engagements of Captain Sabine in his late voyage to the Polar Seas, were such as to occupy his time so extensively, that it was scarcely to be expected that other objects could have been attended to: but, ever zealous and active, the departments of zoology and botany are indebted to his exertion and industry for many interesting additions made and collected in the countries which he visited during the last summer.

Captain Sabine embarked on board His Majesty's ship Griper, commanded by Captain Clavering, in May 1823, for the purpose of carrying on a series of observations on the pendulum in the high latitudes of the northern hemisphere. He first visited Hammerfest, situated near to the north cape of Norway; from thence he went to Spitzbergen; and afterwards proceeded to the eastern side of Greenland, the coasts of which country were explored during his stay, from the 72d to between the 75th and 76th degrees of north latitude.

The specimens of plants collected by Captain Sabine at the above three stations, were presented by him on his return to the Horticultural Society of London, in whose library they are deposited,

posited, after having been examined by Dr. Hooker, Professor of Botany at Glasgow, whose interesting account of them is, by the order of the Council of the Society, now presented to the Linnean Society.

PLANTS FROM THE EAST COAST OF WEST GREENLAND.

Cl. I. DICOTYLEDONES.

RANUNCULACEÆ.

1. RANUNCULUS.

1. *R. nivalis.*

Inhabits the cold northern parts of Europe, Asia and America. It appears to have been first discovered in Spitzbergen by Martins, where it affects the sea-coast, as it also does the shores of Arctic America (*Rich.*). It was among the plants found in Melville Island, and there are numerous specimens of it, gathered in the various places visited by Captain Parry in his late voyage. In Iceland it inhabits the high mountains of the interior; as it does also in Lapland, where Wahlenberg tells us it is found to occur rarely on maritime alps at the North Cape. On the Altaic Alps of Siberia (*Laxmann*).

The form and size of the leaves, and the number of their lobes, are equally variable in these as in Captain Parry's specimens, and include the variety which has been called *sulphureus*.

2. *R. auricomus.*

Found in various parts of Europe, extending as far south as Greece. Gmelin gives it as an inhabitant of western Siberia, Thunberg

Thunberg of Japan, and Pursh of Pennsylvania. In the north of Europe it is found in Nordland (*Wahlenberg*); and I have reason to think, that the *R. affinis* of Brown and Hooker (in Parry's 1st and 2d Voyages) will prove but to be slight varieties of this plant.

Since only one specimen of *R. auricomus* exists in Captain Sabine's collection, it is probably rare in Greenland. In the temperate parts of Europe it inhabits wooded places.

3. *R. glacialis.*

A native of high mountains, both in the north and south of Europe; of the Pyrenees, Switzerland, Hungary and Austria. Not found in Britain. It occurs on the Lapland Alps, but not on those in the neighbourhood of the sea, nor below the higher summits of the mountains. Captain Scoresby gathered it in East Greenland (it is incorrectly called *R. nivalis* by Hooker in Scoresby's East Coast of West Greenland); and this is probably the extent of its western range; for it was not seen by Dr. Richardson in Arctic America, nor was it found in Captain Parry's or Captain Ross's expeditions, except it be the plant that is mentioned by Mr. Brown as "*Ranunculus sulphureus forte*, vel *glacialis* species e fragmentis non determinanda." *Br. in Ross's Voy.*

PAPAVERACEÆ.

2. Papaver.

4. *P. nudicaule.*

Confined to the northern and principally to the alpine regions of Europe, Asia and America. Upon the tops of the central range of mountains in Norway, called the Dover Chain, as stated by Professor C. Schmidt in De Candolle. In Eastern Siberia;

Siberia; the Altaic mountains, Dahuria, Unalaschka, Labrador. On the sea-shore of Arctic America (*Richardson*); and upon adjacent islands not uncommon.

CRUCIFERÆ.

3. Draba.

5. *D. alpina.*

There are three varieties of this plant which deserve notice, although differing principally in their size and degree of pubescence.

1. *major*; glabriuscula, foliis biuncialibus (siccitate reticulatis) marginibus hic illic evidentissime dentatis.

A large and very beautiful state of *D. alpina*, with very few hairs on any part of the plant: its *scape* more than 3 inches high, and, as well as the pedicels, quite glabrous. *Calyx* very slightly hairy. *Corymbs* almost an inch in diameter, of a deep bright yellow.

2. *intermedia*; pilosa, foliis pollicaribus (nec reticulatis) integris vel rarissime obsoletissime dentatis.

Marginal hairs of the leaves long and simple; those of the disc, as well as of the scape, much branched: hairs few on the calyx. *Corymbs* smaller than those of the first variety, and the flowers generally paler.

3. *nana*; valde pilosa, nana.

Leaves scarcely half an inch high; scape about an inch, and, as well as the calyx, very hairy.

Inhabits the mountains of Lapland and Norway, and the arctic regions of America. West coast of East Greenland (*Greville*).

With regard to pubescence, this species appears as liable to variation as the following one is known to be.

6. *D. hirta.*

A very few specimens of this plant exist in the collection, and these belong to what I have considered as a fourth variety of *D. hirta* in my account of the plants of Captain Parry's second Voyage: as "1—3 pollicaris, foliis integerrimis, scapo gracili aphyllo."

Some or other of the numerous varieties of this species are found in the alpine countries of the north of Europe and America; and if the plant be, as I suspect, the *R. nivalis* of De Candolle, it is also a native of the mountains of Switzerland, Savoy and Dauphiny.

7. *D. muricella.*

This quite agrees with the species so denominated by Wahlenberg, in the nature of its pubescence: but two out of five stalks are furnished with a leaf; whereas Wahlenberg defines the *D. muricella* as having a "scapus semper nudus." I am here more confirmed in an opinion, that I have elsewhere expressed, that this is but a densely pubescent variety of *D. hirta*. The germens and silicules are stellato-pubescent.

Whether a variety or a species, this plant exists on the alps of Switzerland, as well as those of Lapland, Norway and Siberia. Dr. Richardson found it in Arctic America; Mr. Jameson on the west coast of Greenland, and Captain Parry in the Strait of the Fury and Hecla.

De Candolle has placed the *D. muricella* in his division of the genus *Chrysodraba*; whereas the inflorescence is constantly white. Perhaps the *D. tomentosa* of that author might safely be referred hither.

8. *D. in-*

8. *D. incana?*

The few specimens of this plant are destitute of root-leaves; but from the nature of those upon the stem, as well as of the silicules, I have reason to believe it the true *D. incana*; the *contorta* of Ehrhart and De Candolle. If so, it is likewise an inhabitant of the alps in the south of Europe, as the Pyrenees and Caucasus; as well as of England and Scotland, Unalaschka, Greenland and Labrador.

It does not appear, however, to have been met with in Arctic America, or on the adjacent islands.

4. Cochlearia.

9. *C. fenestrata?*

Not in perfect fruit; but probably the same as the arctic *Cochlearia*, described by Mr. Brown and myself as found by Captains Ross and Parry. If it be really a distinct species, our present knowledge of it is confined to the countries visited by those gentlemen; in which probably may be included Greenland and Spitzbergen.

CARYOPHYLLEÆ.

5. Silene.

10. *S. acaulis.*

Frequent on all the alps of Europe; in Iceland and Greenland. On the coast of Labrador, and shores of the Arctic Sea (*Richardson*). In Baffin's Bay (not in Melville Island); on Upper Savage Island, and Duckett Cove (*Captain Parry*).

6. Lychnis.

11. *L. apetala.*

Var. glanduloso-pubescens.

Most of the specimens are deeply tinged with purple, especially on the calyx and stem; and the latter part especially is thickly covered with a dense pubescence, the hairs jointed, crisped, and frequently terminated with a gland. The more common state of the plant is slightly pubescent, having the leaves almost wholly glabrous. The capsule is rather longer than the calyx, and opens with five obtuse teeth.

Native of Lapland, Norway and Siberia, beyond the Aldan river, and near the rivers Biela and Jana; it grows also in Arctic America (*Richardson*); on Melville Island and Spitzbergen (*Captain Sabine*). I am not aware that it has been found before in Greenland; though, if we may judge from the number of specimens brought thence, it appears to be not uncommon there. Many of them are from Pendulum Island.

12. *L. dioica.*

Var. nana, caule subnullo, foliis lanceolatis margine tomentoso-ciliatis.

A most beautiful variety, with the flowers nearly as large as in the common appearance of the species, nestling among the radical leaves, which are from an inch and a half to two inches long, scarcely pubescent on the disc, but ciliated with soft hairs at the margin.

This variety does not appear to be noticed by any author that I am acquainted with. It is the purple-flowered state of the plant; the more common appearance of which is plentiful throughout Europe in moist and shady places. It is found also on the west coast of Greenland. In Lapland, in Carpathia, and in Scotland, it ascends to a considerable height up the mountains; and in the latter country, near the summit of Ben Lawers, I have met with a dwarf variety, somewhat

somewhat approaching the present one, but thrice or four times the size of it.

7. Cerastium.

13. *C. alpinum.*

Inhabits the mountains of Switzerland and the Pyrenees, and is probably general from the southern and temperate parts of Europe to the extreme north.

It is not noticed either by Pursh or Richardson as existing on the continent of America (where, however, *C. viscosum* reaches to the shore of the Arctic Sea: *Richardson*); but is found at Igloolik, Fern Island, Baffin's Bay, Melville Island, and Greenland.

8. Stellaria.

14. *S. humifusa.*

This appears to be entirely a maritime plant. It is found in Nordland and Finmarck, according to Wahlenberg, who has however confounded it with the *S. crassifolia* of Ehrhart. I possess it from Varanska, near the North Cape, from Dr. Swartz. Dr. Hornemann has sent it to me from Greenland, where likewise Mr. Jameson found it; and it was met with during Captain Parry's second voyage at Neerlo-Nakto.

15. *S. cerastoides.*

A small and injured specimen, sufficient, however, to satisfy me that it is the real plant. A native of Lapland, Iceland, the alps of the south of Europe, as the Carinthian, those of Dauphiny and the Pyrenees. Nowhere noticed as inhabiting the continent of America.

16. *S. Ed-*

16. *S. Edwardsii.*

S. nitida. *Hooker in Scoresby's E. C. of West Greenland.*

Found, previously to its being discovered in West Greenland by Captain Scoresby, in some part of that country by Giesecké and Wormskiold. Dr. Richardson detected it on the shores of the Arctic Sea; and Captain Parry at Melville Island, Igloolik, &c.

9. ARENARIA.

17. *Arenaria rubella.*

A. quadrivalvis. *Br.*

First found by Wahlenberg, near the summit of the alps of Lyngen in the northern part of Nordland, at an elevation of 3000 Parisian feet above the level of the sea: afterwards in Melville Island. No other stations are at present known for it.

18. *A. ciliata.*

Found on mountains in the south as well as the north of Europe, as the Rhætian and Leontine, Pyrenean, Swiss and Carpathian alps. Likewise in Norway and Lapland; but nowhere on the continent of America.

19. *A. peploides.*

Inhabits the sea-shore of the temperate and northern parts of Europe: not extending probably further south than Bordeaux. Common in Germany, Britain, Iceland, Sweden, Norway, Lapland, Siberia (*Pallas*); the coast of Labrador, the sea-shore of America and Hudson's Bay (*Richardson*). Our arctic voyagers, however, do not appear to have met with it. Wahlenberg mentions that this plant ascends along the sandy banks of the river Jana as far as Seida, above three miles (Swedish ones I presume) distant from the sea.

Dr. Horne-

Dr. Hornemann had previously transmitted it to me from Greenland.

SAXIFRAGEÆ.

10. Saxifraga.

20. *S. oppositifolia.*

This is found upon mountains throughout Europe; on the Pyrenees, in Switzerland, Britain, Lapland, Siberia, Iceland and Spitzbergen. In Newfoundland and Labrador. On the shores of the Arctic Sea, &c.

21. *S. Hirculus.*

Of this beautiful plant the specimens rarely exceed two inches in height. Inhabits Piedmont and the Jura, where it is alpine; Germany and England but rarely. More frequent in the north of Europe, as in Sweden, Lapland and Siberia. Not in the Flora of North America. Found on the shores of the Arctic Sea by Dr. Richardson: on Melville Island; abundant at Igloolik and other places visited by Captain Parry in the second expedition under his command: Baffin's Bay.

22. *S. flagellaris.*

This most remarkable plant was first discovered, according to Mr. Don, at Cape Newenham, on the north-west coast of America, by Mr. Nelson, during Captain Cook's third voyage; and his specimens still exist in the Banksian Herbarium. Mr. Don further observes, that Pursh, who named the plant *setigera* after those individuals, is wrong in stating the flower to be small and white, which is indeed quite at variance with the true character, for the blossoms are large and yellow. Dr. Adams found it in the Caucasian Alps; and both in Baffin's

fin's Bay and in Melville Island this species is tolerably abundant; and so familiar was its appearance to the sailors of those expeditions, that they gave it the very appropriate name of *Spider Plant*.

Neither did Dr. Richardson, nor Captain Parry in his second voyage, meet with this species. In Greenland it seems to have been found plentifully by Captain Sabine, although no voyagers had previously brought it from that country.

Mr. Don is surely mistaken in referring to this plant the *S. aspera* of Bieberstein's *Flora Taur. Caucas. v.* i. *p.* 314. The *S. flagellaris*, according to Mr. Brown, is described by Bieberstein in the third volume of that work, which I do not myself at present possess.

23. *S. rivularis.*

Inhabits the alps, principally of the north of Europe. Scotland is perhaps its most southern latitude, and there it is very rare. Found in Siberia, Lapland and Norway. In Labrador (*Pursh*); Igloolik and adjacent islands (*Captain Parry*); also in Melville Island and Baffin's Bay, if Mr. Brown's *S. hyperborea* be the same plant, or a variety of it.

24. *S. cæspitosa.*

Var. surculis nullis, foliis plerumque trifidis glanduloso-ciliatis, caule uni-trifloro, calyce nigro-pubescente glanduloso.

S. uniflora. *Br. in Parry's 1st Voy. App. p.* cclxxiv.

This is exactly the same variety as I have described in the Botanical Appendix to Parry's second Voyage, as found at Igloolik. I know of no figure which accords so well with this as the Norwegian *S. cæspitosa* (*Gunner's Flora Norveg. t.* 7. *f.* 4.).

Whether

Whether the same variety has been discovered in other countries I know not. A smaller and more densely-tufted state of the plant is likewise found in Greenland, but does not exist in this collection. A variety, with more or less elongated surculi, occurs in various parts of Europe in alpine regions.

25. *S. foliolosa. Br.*

Found in Lapland, according to Linnæus, who has described it as a variety of *S. stellaris*, with which I fear indeed that it must be constantly re-united. In Melville Island (*Captain Parry*); and, during the second expedition of that commander, it was found by Mr. Edwards.

There are only two specimens in Captain Sabine's collection; but he likewise detected it in Spitzbergen.

The true *S. stellaris* is also found in Greenland; on the west coast according to Mr. Greville. It is indigenous to Labrador and Canada, according to Pursh; although Dr. Richardson did not meet with it in Arctic America.

26. *S. nivalis.*

Principally confined to the high mountains of the north of Europe; Scotland being probably its most southern *habitat*. It grows in Lapland, Norway, Iceland, Labrador and Canada (*Pursh*); shores of the Arctic Sea (*Richardson*); and abundantly on the adjacent islands; in Spitzbergen (*Martins*).

27. *S. cernua.*

La Peyrouse mentions this as inhabiting the Pyrenees; and upon the authority of Schleicher's Herbarium it is given as a native of the Swiss alps. It is rare on the mountains of Scotland; and exists in Pallas's collection from Siberia. In Norway, Lapland and Iceland it is found; also in Spitzbergen,

Baffin's Bay, Melville Island, Igloolik, &c. Mr. Scoresby gathered it on the east coast of West Greenland; and Dr. Richardson on the shores of the Arctic Sea.

ROSACEÆ.

11. Dryas.

28. *D.* ——*?*

As there is only a fructified scape of this plant, I am unable to say whether it belonged to *D. octopetala* or to *D. integrifolia*.

12. Potentilla.

29. *P. nivea.*

α. foliis supèr villosiusculis viridibus, subtus niveo-tomentosis. *Br.*

β. foliis utrinque villosiusculis, paginis concoloribus. *Br.*

This species is found as far south in Europe as the alps of Tyrol, Dauphiny and Switzerland. Gmelin gives it as an inhabitant of Siberia; and it is a native of Norway and Lapland. Colmaster found it in Labrador; Richardson on the shores of the Arctic Sea; Jameson on the west coast of Greenland (for I presume that it is the *P. Jamesoniana* of my friend Mr. Greville); Captain Parry in Melville Island: and it was also discovered in several of the places visited during that navigator's second voyage.

ONAGRARIÆ.

13. Epilobium.

30. *E. latifolium.*

A beautiful species, confined entirely to high northern latitudes, Siberia and Kamschatka (*Gmelin*); Norway, Iceland, Labrador

Labrador and the north-west coast of America (*Pursh*); shores of the Arctic Sea. Found previously on the east coast of Greenland by Scoresby. Lyon Inlet, &c. (*Captain Parry*).

COMPOSITÆ.

14. Leontodon.

31. *L. palustre.*

α. floribus luteis.

β. floribus purpurascentibus.

Common as this plant appears to be in the arctic regions, it is by no means peculiar to them, but is extended over various parts of Europe; as Carniola, Caucasus, Hungary, France, Bohemia, Germany and Great Britain. In the wooded country of North America, lat. 54° N. to the shores of the Icy Sea. Probably, too, it is the species mentioned by Mr. Brown, but not described, as differing from *L. Taraxacum*, and inhabiting wet shady woods. Baffin's Bay? Melville Island, Duckett Cove, *Captain Parry*.

The variety *β*. above mentioned has its flowers strikingly tinged with purple; and the lesser scales of its involucre more reflexed than in *α*.

14. Arnica.

32. *A. angustifolia. Vahl. in Fl. Dan. v.* ix. *t.* 1524.

A. montana *β*. *Linn., Wahl., Br.*

A northern plant; native of Sweden, Lapland and Greenland, in which latter country it was first found by Giesecké near the colonies of Osnenak and Godhaon.

Mr. Brown does not consider this as specifically distinct from *A. montana α., Linn.*; a plant which is found in the south as well as in the north of Europe and America, and of which

Mr. Brown further considers the *A. plantaginifolia* and *A. fulgens* to be varieties.

Mr. Scoresby's Greenland specimen exactly agrees with this, and with what I have also seen from Melville Island.

16. ERIGERON.

33. *E. uniflorum.*

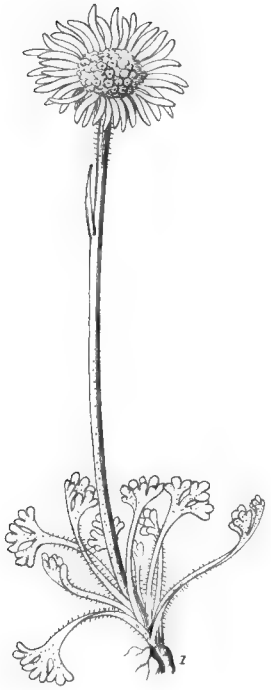
I am quite unable to distinguish this from the *alpinum* of authors. Both may be considered as inhabiting the southern alps, as those of Switzerland, Pyrenees, the Jura, Carniola, Dalmatia and Saltzberg; and more frequently still those of the north of Europe. In Scotland it occurs on a few of the highest mountains. In Lapland it appears common, as it is also on the low grounds in Iceland. Colmaster discovered it in Labrador. I have a specimen gathered by Mr. Goldie on a river bank near Quebec. Shores of the Arctic Sea (*Richardson*). It does not appear in the Arctic Flora of Captain Ross's or Captain Parry's first Voyages. But it was discovered by the latter commander in Repulse Bay.

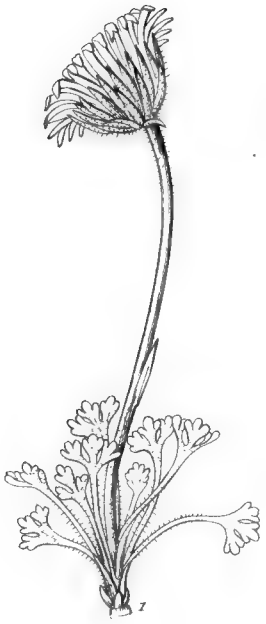
34. *E. compositum*, subacaule, foliis radicalibus longe petiolatis triplicato-tripartitis, laciniis linearibus divaricatis, caulinis linearibus plerumque indivisis, caule superne nudo unifloro.

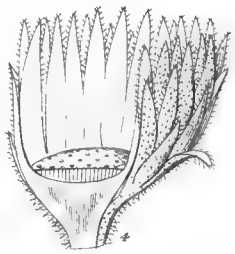
TAB. XIII.

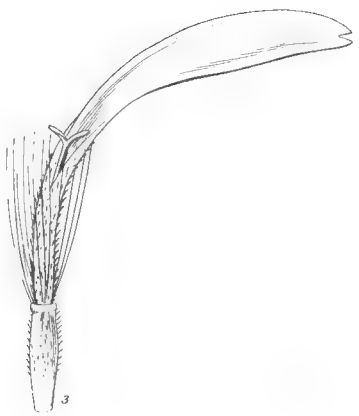
E. compositum. *Pursh Fl. of N. Amer. v.* ii. *p.* 535.
Cineraria Lewisii. *Rich. in Franklin's Journ. App. p.* 748.

Radix ut videtur parva, perennis, pauce fibrosa. *Caulis* nullus. *Folia* radicalia, longe petiolata, profunde tripartita, laciniis cuneiformibus trifidis, segmentis subovatis obtusis, pilis brevibus obsita. *Petioli* lineares ciliati, basi dilatati subvaginati. *Scapi* tri-quinque pollicares pilosiusculi, teres, nudi, vel foliolo solitario lanceolato integro instructi.









W. J. Hooker del.

Erigeron compositum.

J. Curtis sculp.

structi. *Flos* solitarius, terminalis, magnitudine *Bellidis perennis* vel paulo majore. *Involucrum* hemisphæricum e squamis vel laciniis lineari-lanceolatis viridi-fuscum; interioribus longitudine disci æqualibus; exterioribus minoribus et non raro recurvis; omnibus pilosis. *Flosculi disci* hermaphroditi numerosi, flavi, tubulosi, apice quinquefidi. *Antheræ* flavæ. *Stylus* antheris vix longior. *Stigma* bifidum: radii albi ligulati (demum fide Purshii rubicundi), basi tubulosi, pubescentes; ligula lineari-lanceolata glabra apice bifida. *Pericarpia* vel *Achenia* immatura oblonga, pilosa, hispida. *Pappus* sessilis, piloso-scaber. *Receptaculum* planiusculum, punctatum, nudum.

A very singular plant, of which several specimens are in this collection, and which has been nowhere found besides, but on the banks of the Kooskoosky by Lewis, according to Pursh; and by Dr. Richardson in his expedition between Point Lake and the Arctic Sea.

The first appearance of this plant resembles so entirely that of an *Erigeron*, that I had no hesitation, from that circumstance alone, in referring it to this genus; and indeed, had its leaves been lanceolate and simple, I should have passed it over as a variety of *E. uniflorum*. My friend Dr. Richardson, however, has removed it to the genus *Cineraria*; though, upon a minute examination of its characters, I can find no circumstance in them to vary from *Erigeron*.

CAMPANULACEÆ.

17. Campanula.

35. *C. uniflora.*

A northern plant, found in Lapland, only, of the continent of Europe. Rottboel has already given it as an inhabitant of Greenland;

Greenland; Dr. Richardson, of the shores of the Arctic Sea. It was found likewise in Melville Island and in Five Hawser Bay by Captain Parry.

VACCINEÆ.

18. VACCINIUM.

36. *V. uliginosum.*

A small-leaved variety, with the foliage entirely of a reddish hue; from the circumstance, perhaps, of its being gathered in autumn.

This species is a native of marshy and generally alpine grounds in various parts of Europe, Asia and North America; as France, Switzerland, Piedmont, Germany, Britain, Lapland, Kamschatka, about Lake Baikal and other parts of Siberia, and Iceland: in various parts of North America, to the shores of the Arctic Sea, and on the islands adjacent, as well as in Greenland.

ERICINEÆ.

19. RHODODENDRON.

37. *R. lapponicum.*

This charming plant may also be considered as exclusively arctic, the alps of Dahuria only being an exception. It seems otherwise confined to Lapland, Norway (but rare), the shores of the Arctic Sea and Greenland.—Only one specimen of it exists in the present collection.

20. ANDROMEDA.

38. *A. tetragona.*

Inhabiting only high northern latitudes. Found exclusively in Lapland, Spitzbergen, Labrador and Canada, the north-west

west coast of America, Baffin's Bay, the shores of Arctic America, Melville Island, Barrow-river, and Greenland.

POLEMONIACEÆ.

21. Polemonium.

39. *P. cæruleum.*

Var. nana.

This singular variety does not exceed three inches in height: and the leaves rarely attain the length of two; the pinnæ are placed very close; but the corymb of flowers is most lovely, bright purple, nearly as large in diameter as the whole plant itself is tall, each blossom being three quarters of an inch in breadth. It is common to various parts of Europe, the temperate as well as the northern districts. It is found in Switzerland, about Basle on the Rhine, and on the Jura: in Germany and in England, where it does not affect very alpine situations. In Asia it reaches as high north as Kamschatka; in Siberia it grows about Lake Baikal; and Pennant states it to be a native of Nootka Sound. What Wahlenberg says of the Lapland state of this plant may be applied to the present individuals, although it does not afford any reason to infer that it is of the same diminutive size: "longe speciosior mihi visa est quam in hortis nostris, corollis margine saturatiore cæruleis superbiens."

SCROPHULARINÆ.

22. Pedicularis.

40. *P. hirsuta.*

An arctic species, first discovered in Lapland by Linnæus. It exists also in Siberia, Spitzbergen, shores of the Arctic Sea, in

in America, Baffin's Bay (it does not appear in the Melville Island Flora); Igloolik, &c.

PLUMBAGINEÆ.

23. Statice.

41. *S. Armeria.*

This is perhaps the most extensively diffused plant of any in the collection. It grows both upon the sea-beach and on most of the high mountains which intervene between the shores of the Mediterranean and the utmost limit of arctic vegetation. Nor is it wholly confined to alpine spots and the vicinity of the sea; I have gathered a variety of it in grassy pastures in the environs of Paris: but though abundant in that particular *habitat*, I believe its occurrence in such situations to be very rare. In America we know, upon the authority of Pursh, that it extends from Pennsylvania to Virginia, keeping along the shores; and Dr. Richardson found it on the sea-coast of Arctic America.

POLYGONEÆ.

24. Oxyria.

42. *O. reniformis.*

A well-known inhabitant of all the arctic regions, where it grows plentifully upon a level with the sea. In the south of Europe it affects only the most alpine situations, as the Pyrenees, in Auvergne, Switzerland, &c.

In America, besides being a native of Labrador and the most northern parts of that continent with the adjacent islands, we are lately informed by Dr. Torry in his "Description of some new or rare Plants from the Rocky Mountains," that it grows upon James's Peak, one of the highest of that range, at

an elevation of 10,000 feet above the level of the ocean, near the limit of perpetual snow. The author however observes, that the species found there differs somewhat from ours, in having the flowers uniformly diandrous and the leaves not emarginate.

25. Polygonum.

43. *P. viviparum.*

This, like the last plant, is of common occurrence in the north of Europe, of Asia and America, particularly the arctic districts. In the alps of the south of Europe it also appears, but always growing at a great elevation above the level of the sea.

Besides being common in Arctic America, it is found in Labrador and Canada; and my friend Mr. Boott has gathered it upon the summit of the White Mountains.

26. Königia.

44. *K. Islandica.*

Found in Iceland (as its specific name implies); also in the Faroe Islands and Greenland; and, as far as my knowledge goes, no where else.

AMENTACEÆ.

27. Salix.

45. *S. arctica. Br.*

First discovered in Baffin's Bay, during Captain Ross's voyage; afterwards in Greenland, Melville Island, and Igloolik; thus well deserving of the appellation which Mr. Brown has applied to it.

Cl. II. MONOCOTYLEDONES.

JUNCI.

28. Luzula.

46. *L. hyperborea. Br. in Parry's 1st Voy. App. p.* cclxxxiii.

If this be really a distinct species, it is, as far as I at present am aware, confined in its places of growth to Spitzbergen, Melville Island, Duke of York's Bay, Duckett Cove, Southampton Inlet, and Greenland. But in the present collection there are some individuals which I can by no means distinguish from *L. arcuata*, except in their having a greater number of flowers in each capitulum or spikelet.

CYPERACEÆ.

29. Carex.

47. *C. fuliginosa.*

Found on the summit of the Carinthian Alps in Arctic America (*Richardson*); Duke of York's Bay, &c. (*Captain Parry's 2d Voyage*); and in Melville Island, if *C. misandra* be the same, which I have however not seen, but the description of which agrees with this species in many points.

30. Eriophorum.

48. *E. capitatum.*

Inhabits the Pyrenees, the alps of Switzerland, Piedmont, Germany, Scotland (very rare), Lapland, Iceland and Melville Island, as well as Greenland. It was gathered by Mr. Edwards during Captain Parry's 2d voyage, but no particular station is given. It is not noticed by Pursh or Richardson.

49. *E. an-*

49. *E. angustifolium.*

Frequent in the temperate and warmer parts of Europe (where, indeed, it is not peculiar to the alpine districts), as well as in the northern and arctic regions; Siberia (*Gmelin*); frequent, too, in mountain meadows generally in North America, in the woody country from latitude 54° to 64° north; on the shores of the Arctic Sea (*Richardson*), and adjacent islands.

GRAMINEÆ.

31. Alopecurus.

50. *A. alpinus.*

This species was first detected in Scotland, upon Loch-na-Gare, a high mountain in Aberdeenshire, by Robert Brown, Esq., in 1794: afterwards found in Greenland by Giesecke, who named it *A. antarcticus* in Brewster's *Cyclopedia*, according to Brown; while Hornemann called it *A. ovatus* in *Flora Danica*. It has been discovered likewise in Melville Island, Baffin's Bay, shores of the Arctic Sea, America (*Richardson*); and in Igloolik, &c. (*Captain Parry*).

32. Poa.

51. *P. angustata. Br. in Parry's 1st Voy. App. p.* cclxxxvii.

Hitherto this grass had only been found in Melville Island and at Igloolik.

52. *P. arctica. Br. in Parry's 1st Voy. App. p.* cclxxxviii.

Inhabits Baffin's Bay, Melville Island, Igloolik, and the east coast of West Greenland.

53. *P. laxa.*

α. *panicula angustata gracili, spiculis paucioribus.*

P. laxa. *Hænke Fl. Sudet. p.* 118. *Host Gram. Austr. v.* iii. *p.* 10. *t.* 15.

P. flexuosa. *Sm. in Engl. Bot. t.* 1123.

β. panicula latiuscula compacta, rigidiore.

The *var.* α so perfectly agrees with the figure in Host's *Gramina Austriaca*, that I have no hesitation in considering it to be really that plant. Of the β I am more doubtful. Its panicle is much broader; the spikelets more numerous and more compact; their pedicels shorter and less slender; and the whole is of a more purple colour. The general form and structure of the spikelets are the same.

The more common state of this species is found in the alps of Switzerland, Germany and Scotland; also in the subalpine districts of Lapland.

33. FESTUCA.

54. *F. ovina.*

Var. corollis valde pilosis.

Only one, and that a very injured, specimen of this grass is in the collection. The calyx is glabrous or only slightly ciliated at the margin; the florets remarkably hairy, more so than is represented in the *Fest. hirsuta* of Host, or the *F. rubra* of *Engl. Botany*. The leaves are wanting.

Festuca ovina is common throughout Europe, and at various elevations. Pursh has it not in his Flora of North America, nor Elliott in his recent account of the plants of the "middle and northern sections" of the United States: but Dr. Richardson found it plentifully, and it has been gathered by the Arctic voyagers.

34. DES-

34. Deschampsia.

55. *D. brevifolia. Br. in Parry's 1st Voy. App. p.* ccxci.

Found hitherto only in Melville Island, and during Captain Parry's 2d voyage. This comes very near to the *Aira lævigata* of our country.

35. Trisetum.

56. *T. subspicatum. Palisot Agrostogr. p.* 88.

A native of the Pyrenees, the alps of Switzerland and Piedmont; Iceland and Lapland, Melville Island, and Duckett Cove. In America Dr. Richardson found it in the woody country from between lat. 54° and 64° N.

Cl. III. ACOTYLEDONES.

FILICES.

36. Aspidium.

57. *A. fragile.*

It inhabits alpine countries, probably throughout Europe, but especially its northern parts; as Siberia, Lapland, &c. as far as the North Cape. Dr. Richardson met with it in the woody country of North America between lat. 54° and 64°; and it was seen by the naturalists of Captain Parry's second expedition.

The *A. tenue* of Pursh and Michaux seems to be scarcely different; and is found in clefts of rocks from Canada to Virginia.

MUSCI.

MUSCI.

37. POLYTRICHUM.

58. *P. septentrionale.*

Found on the highest summits of the alps of the south and north of Europe; Melville Island; south shore of the Strait of the Fury and Hecla.

38. APLODON.

59. *A. Wormskioldii. Br. in Parry's 1st Voy. App. p. 299.*

Inhabits Greenland, Melville Island, and Igloolik.

LICHENES.

39. LECANORA.

60. *L. elegans.*

A native of maritime rocks throughout Europe, but most plentiful in the northern countries, as Iceland and Lapland. Shores of the Arctic Sea, America.

40. USNEA.

61. *U. sphacelata. Br. in Parry's 1st Voy. App. p. 307.*

A beautiful plant, and very nearly allied to a species of the same genus which I have lately received from New South Shetland.

Found hitherto only in Spitzbergen and Melville Island.

SPITZ-

SPITZBERGEN PLANTS.

Cl. I. DICOTYLEDONES.

RANUNCULACEÆ.

1. *Ranunculus nivalis:* supra in *Pl. of Greenland.*

The specimens of this are remarkably fine, and larger than I have seen from any other country.

2. *R. pygmæus. Wahl. Fl. Lapp. p.* 157.

An inhabitant of Lapland, Norway, Finmarck, Labrador (according to *Pursh*), and the shores of the Arctic Sea, North America (*Richardson*).

PAPAVERACEÆ.

3. *Papaver nudicaule,* supra in *Pl. of Greenland.*

CRUCIFERÆ.

4. *Draba alpina,* supra in *Pl. of Greenland.*

5. *D. micropetala. Hook. in Parry's 2d Voy. App.*

A single specimen only of this exists, exactly corresponding to what I have described in the work above referred to.

6. *D. hirta, var.* 5. *Hook. in Parry's 2d Voy. App.*

This, which was found in several places during Captain Parry's 2d voyage, differs but little from my 4th variety of the same species, mentioned in the account of Captain Sabine's Greenland Plants.

7. *Coch-*

7. *Cochlearia Danica. Linn. Sp. Pl. p.* 903.

This has the lower leaves almost deltoid, the upper ones mostly petiolated, and is altogether of the common size and the usual habit of *C. Danica*. There are no perfectly formed seed-vessels.

8. *Cardamine bellidifolia*, supra in *Pl. of Greenland.*

CARYOPHYLLEÆ.

9. *Lychnis apetala*, supra in *Pl. of Greenland.*
This is the common and more glabrous state of the plant.

10. *Cerastium alpinum*, supra in *Pl. of Greenland.*
Arenaria rubella, supra in *Pl. of Greenland.*

SAXIFRAGEÆ.

11. *Saxifraga oppositifolia*, supra in *Pl. of Greenland.*
12. *S. rivularis*, supra in *Pl. of Greenland.*
13. *S. cæspitosa*, supra in *Pl. of Greenland.*

Of this species there are two varieties, the one similar to what I have noticed above in the account of Greenland plants, only being rather less glandular; the other, that dwarf and densely-tufted variety, which has gone under the name of *S. groenlandica.*

14. *S. cernua*, supra in *Pl. of Greenland.*
15. *S. nivalis*, supra in *Pl. of Greenland.*
16. *S. foliolosa*, supra in *Pl. of Greenland.*

ROSA-

ROSACEÆ.

17. *Dryas octopetala. Linn. Sp. Pl. p.* 717.
Var. minor, foliis parvis angustis profunde crenatis.

Found on mountains in the south of Europe, as the Pyrenees, the alps of Switzerland, Savoy, Austria, Britain, Iceland, Lapland, Siberia, Greenland, &c.; high mountains in the north-western part of Canada (*Pursh*); and the woody country of North America, between latitude 54° and 64° north (*Richardson*).

In Britain this plant prefers a calcareous or limestone soil. I possess specimens with the lower half of the leaves crenate, while the upper are entire; thus appearing to unite the two species *octopetala* (or *chamædryfolia*, as Pursh calls it, the number of petals being variable,) with the *integrifolia* (*tenella* of Pursh).

18. *Potentilla nivea β*, supra in *Pl. of Greenland.*

POLYGONEÆ.

19. *Polygonum viviparum*, supra in *Pl. of Greenland.*

20. *Oxyria reniformis*, supra in *Pl. of Greenland.*

AMENTACEÆ.

21. *Salix polaris. Wahl. Fl. Lapp. p.* 261. *t.* 13. *f.* 1.

This appears to have been first discovered in Spitzbergen by Martins; afterwards by Wahlenberg and Liljeblad in Lapland. These, I believe, are the only stations for this interesting plant.

The shape of the leaves, the size and habit of the species, bring it very near to *S. herbacea*; but the downy capsules well distinguish it.

Cl. II. MONOCOTYLEDONES.

22. *Luzula hyperborea*, supra in *Pl. of Greenland.*
Poa laxa, supra in *Pl. of Greenland.*

This has the common appearance of *P. laxa*; some of the specimens are however viviparous.

Cl. III. ACOTYLEDONES.

23. *Polytrichum alpinum.*

A common species on high mountains in all parts of Europe, particularly in the north.

24. *Bryum cæspititium.*

Found in almost all parts of the world.

PLANTS FROM THE NORTH CAPE.

Cl. I. DICOTYLEDONES.

RANUNCULUS.

1. *Ranunculus acris.*

Common throughout Europe, Tauria, Siberia, Iceland. From New York to Canada; but not yet found in Arctic America.

2. *R. au-*

2. *R. auricomus*, supra in *Pl. of Greenland.*

Trollius europæus.

Confined, as it appears, entirely to Europe; from the extreme north to the south: not found however in Iceland.

3. *Caltha palustris*, var. *radicans. Hooker Fl. Scot. P. I. p.* 176. C. radicans. *Engl. Bot. t.* 2175.

Assuredly but a variety of *C. palustris*, becoming dwarf and creeping, with some alterations in the form of the leaves in cold and alpine situations. It inhabits the whole of Europe, from Greece to the North Cape; Iceland. America, from Pennsylvania to about 60° north. *Caltha arctica* of Brown is a plant very nearly allied to this, and is found in Melville Island.

CARYOPHYLLEÆ.

4. *Silene acaulis*, supra in *Pl. of Greenland.*

CRASSULACEÆ.

5. *Rhodiola rosea.*

Frequent in Europe, inhabiting the alps solely in the southern part, as the Pyrenees, the mountains of Dauphiny and Switzerland, &c. In Britain it grows on the mountains; and in the northern extremity, as Orkney and Shetland, abundantly on the rocks of the sea-coast. It is found in similar situations in the arctic parts of the continent of Europe and in Iceland. Not a native, I believe, of the continent of America: but it has been brought by Captain Scoresby from Greenland.

CRUCIFERÆ.

6. *Draba incana*, supra in *Pl. of Greenland.*
Cochlearia anglica?

Specimens not in fruit. The species appears to be confined to the more northern districts of Europe; England, perhaps, being its most southern range.

SAXIFRAGEÆ.

7. *Saxifraga cæspitosa*, supra in *Pl. of Greenland.*

The calyx and pedicels are less glandular than in the Greenland and other arctic specimens.

VIOLEÆ.

8. *Viola biflora.*

Common on the Pyrenees and the alps of Switzerland, Jura, and those of Germany; Siberia, Lapland and Norway. Not found, as far as I know, in England, Iceland or America.

ROSACEÆ.

9. *Potentilla verna.*

Found throughout the whole of Europe, Iceland, and the north of Asia. This is certainly the species figured in *English Botany*; and the one which I noticed under that name in Scoresby's East Coast of West Greenland (as far as my recollection serves me, for I have no specimens in my possession) is the same plant; although my learned and valued friend Mr. Brown considers that individual to belong to the variety β of *P. nivea.*

10. *Al-*

10. *Alchemilla vulgaris.*

Peculiar to Europe; in the south of which, as Tauria, it is common in sub-alpine spots; in the north, as Iceland, it grows plentifully on the low grounds.

11. *Rubus Chamæmorus.*

Found only in the north of Europe and America; not reaching in the former country further to the southward than the mountains of Bohemia and Silesia. In America it grows on the highest hills of New England and in Canada. Dr. Richardson met with it in the neighbourhood of the Arctic Sea; and I have gathered it in Iceland.

CAPRIFOLIACEÆ.

12. *Cornus suecica.*

This plant again is a native only of the north of Europe and of Asia; and in Kamschatka. In Britain it is only found in Scotland and the highest parts of England: in Germany it appears to be confined to the Duchy of Oldenberg, Ammerland, Jeiver and Heiligoland.

COMPOSITÆ.

13. *Leontodon palustre?* supra in *Pl. of Greenland.*

The specimens of this plant appear to hold exactly an intermediate rank between those of *Leontodon palustre* and *L. Taraxacum.*

14. *Gnaphalium dioicum.*

Common throughout Europe, especially in the south, as Tauria, affecting the mountains. It has been brought from Siberia

beria and Nootka Sound. Dr. Richardson found it in North America, in the wooded country, from latitude 54° to 64°.

ERICINEÆ.

15. *Azalea procumbens.*

Inhabits Europe, from the Pyrenees and Swiss Alps to the North Cape, Siberia and Iceland. The north-west coast of America (*Mr. Menzies*); White Mountains of New England (*Mr. Boott*); Arctic America (*Dr. Richardson*); Upper Savage Island (*Captain Parry*).

16. *Arbutus Uva Ursi.*

Inhabits the whole of Europe; Siberia, Kamtschatka and Iceland. Common in America, as the pine-barrens of New Jersey, and in mountainous and rocky situations of Canada and New England, and the plains of the Mississippi. In Arctic America (*Dr. Richardson*).

17. *Andromeda polifolia.*

Inhabits the south of Europe, rarely. Near Rouen and La Campine in France. Carniola (*Scopoli*). More common in the north of Europe; plentiful in some parts of England and Scotland. Not seen in Iceland. The American plant described by Pursh appears to be a distinct species, with much longer and narrower leaves.

18. *Menziesia cærulea.*

A northern plant, occurring very rarely in Scotland. More plentiful in Norway, Lapland, Siberia, and Kamtschatka. In Greenland (*Crantz*).

SCROPHU-

SCROPHULARINÆ.

19. *Pedicularis lapponica.*

Found only in Lapland, Siberia, Greenland, Labrador; and near the Arctic Sea by *Dr. Richardson.*

20. *Bartsia alpina.*

In the South of Europe only seen on the Pyrenees and Alps; more common in the north; a native of Iceland, Greenland and Labrador (*Colmaster*).

PRIMULACEÆ.

21. *Trientalis europæa.*

Mostly confined to the north of Europe. In Germany, Britain, Lapland, Norway, Siberia, &c. Not seen in Iceland; and the *Trientalis* of North America is unquestionably a distinct species.

22. *Primula stricta. Fl. Dan. t.* 1385.

P. Hornemanniana. *Lehm. Richards. in Frankland's Journ. App. p.* 733. (sed floribus minoribus, laciniis tubo brevioribus).

P. farinosa β. stricta. *Wahl. Lapp. p.* 60.

Found in Europe, in the Tyrol (*Lehmann*), Norway and Lapland: and in America in the wooded country between latitude 54° and 64° (*Dr. Richardson*).

Cl. III. ACOTYLEDONES.

FILICES.

33. *Polypodium vulgare.*

Plentiful throughout Europe, in Iceland, and Siberia. In America from Canada to Carolina, and in the wooded country from latitude 54° to 64° (*Dr. Richardson*).

24. *P. Phegopteris.*

Not uncommon in Europe; a native of Iceland, but not I believe extra-European.

25. *Aspidium dilatatum.*

Plentiful in Europe; and in America from Pennsylvania to Virginia.

LYCOPODINEÆ.

26. *Lycopodium Selago.*

Found in various parts of Europe: in Iceland: in America from latitude 54° to the Arctic Sea. Upper Savage Island, &c. (*Captain Parry*).

XXII. *Observations on the Natural Affinities that connect the Orders and Families of Birds. By Nicholas Aylward Vigors, Esq. M.A. F.L.S. Communicated by the Zoological Club of the Linnean Society.*

Read December 3, 1823.

On looking back to the progress of zoology since it first began to be cultivated, it may be observed, that the steps by which it has advanced to its present comparative state of excellence have been more rapid within the last few years than during the entire period of its antecedent existence as a science. The vast accessions which have been made to our knowledge of animal life within the present century by the zeal and industry of scientific travellers; the copious fields of investigation which have been opened to the naturalist by the extended relations of European commerce and colonization; the assistance which has been afforded by the sister science of geology, in adding the remains of a former world to enrich the stores and supply the deficiencies of the present, have increased the materials of zoology to an extent which the most sanguine views of its earlier cultivators could scarcely have anticipated. But it is not so much in the additional dignity which has been conferred on the science by this copious accumulation of facts and materials, that its improvement consists, as in the mode of investigation to which it gave rise, and the comprehensive views which it necessarily imparted. In the infancy of the science, the knowledge of individual spe-

cies, while they remained comparatively few in number, was easily acquired and retained. And the naturalist, in devoting his attention to them, seemed to have had no other object in view but to study them in detached and isolated groups, uncompared and unconnected with each other. Nay, after the gradual increase of the materials of zoology had rendered systematic arrangement necessary for their illustration and comprehension, the various systems proposed by scientific writers were confessedly artificial, and instituted alone for the avowed purpose of forming an easy reference, by which the names and qualities of individuals might be discovered. Classification thus held out but a mere index to the volume of Nature; a catalogue which the naturalist might consult to determine a name or identify a species. But new subjects arrived to perplex by their multitude, and new forms to confound by their variety, the limited views of the systematist. The natural growth of his subject, as it expanded beneath his hands, was sufficient of itself to break through the artificial fetters with which he would have circumscribed it. Forced to abandon the narrow paths of his predecessors in a pursuit which seemed calculated, by the inexhaustible profusion it exhibited, to baffle all research, the true naturalist sought in Nature herself for the means of unravelling her apparent perplexities. He studied the affinities of her various groups; he investigated the mutual relations by which they seemed to approach each other; he applied to comparative anatomy as a guide to their analogous conformation; and he traced out their geographical distribution as some clue through the "mighty maze" that lay before him. His mind expanded as the materials of his research became multiplied. He learned to generalize his observations. He looked upon the creation with a more enlarged and philosophic eye—he applied a grander scale to its dimensions—and he ceased to dwell merely on the wonders of the indi-

individual, as he caught a glimpse of the newer and more specious wonders displayed in the extensive affinities and combinations of the whole.

It is to our continental neighbours that we are chiefly indebted for these valuable improvements in zoology. The zeal and ability with which they applied themselves to the study of comparative anatomy in its various branches, have laid the justest foundation for all zoological investigation. It reflects some reproach upon this country that little aid was given to such labours by the industry of her naturalists. I know not the cause why among the different branches of natural history, comparative anatomy alone has hitherto experienced so much neglect: but it is a fact often and deeply lamented, that, with the exception of one or two splendid names which have appeared among the writers on the *Annulosa*, the general poverty of our reputation in zoology forms a striking contrast to the never-dying fame which has been earned by some of our naturalists in the vegetable and mineral kingdoms. Great Britain, however, has made ample amends for her tardy adoption of the more philosophical views of the science, in the masterly use to which she applied them when once adopted, and the rapid strides by which at once, as it were, she outstripped all previous research. It has been reserved for one of her sons to throw a new light upon the sphere of animated Nature, and to bring to view a principle that pervades her works, as beautiful as it is comprehensive. In the year 1819, the enlightened author of *Horæ Entomologicæ* first called the attention of the lovers of science to a principle which he discovered in a minute group of insects; and which, with a comprehensiveness of mind, and an accuracy of execution, seldom united in an individual, he subsequently followed up through the whole range of animal life. It would be superfluous for me to enter into a detail of the important theory so

successfully developed by the distinguished individual to whom I allude, before a Society which is familiarized with the principles in question. It is sufficient in these few preliminary observations to refer to the great revolution which the publication of these principles has effected in zoology. It has raised the science to that elevated rank among the subjects of human research, to which, whatever might have been its intrinsic claims, it was seldom, from the alleged minuteness of its views, allowed to assert its pretensions. The investigation of Nature has ceased to be a mere work of observation: the mind becomes as much employed as the eye; and the intellectual character of the science as undeniably unfolds itself, as its general usefulness, or its acknowledged powers of affording delight. It is no longer devoted merely to minute and limited details, but to grand and sublime combinations; no longer to the investigation of the properties of the individual, but to that of the place which this fills and the part it sustains in the great system of Nature. The diffusion of these principles wrought the same change as may be supposed to have affected the views of the early astronomer, when his attention was withdrawn from the mere observation of the splendid orbs of the firmament, from conjecturing their apparent stations, and summing up their various names, to the more sublime contemplation of the harmonious system in which they revolve through infinite space. But the developement of this theory went still further. To those persons who were induced to seek a more intimate acquaintance with the works of Nature by the noblest, and indeed only legitimate end of all such research—the desire of studying "the wisdom of God in the creation,"—a new source of delight was thrown open, a new region of wonder revealed; as they were now enabled to trace that wisdom not merely in the detail,—not merely in the beautifully combined mechanism of an isolated object,—but in the comprehensive system

system by which all are united, and the harmony that prevails throughout.

The system which has been traced out with so much success by the author of *Horæ Entomologicæ* in various groups of the animal kingdom, prevails in none more conspicuously than in those of ornithology. Having lately devoted considerable attention to that captivating branch of science, I discovered as I advanced, that the larger or primary groups into which it arranged itself were connected together by an uninterrupted chain of affinities; that this series or chain returned into itself; and that the groups of which it was composed preserved in their regular succession an analogy to the corresponding groups or orders of the contiguous classes of zoology. I equally detected the existence of the same principle in most of the subordinate subdivisions, even down to the minutest, to a degree at least sufficiently extensive to afford grounds for asserting its general prevalence. With the permission of this Society, I shall lay before them, as their leisure will permit, some of the results of these inquiries: and, in the present paper, shall trace out the outline of that general arrangement which appears to me to prevail throughout the feathered tribes. In this attempt, however, I must premise, that I aim at no innovations in science, no opposition to the views of those distinguished naturalists who have preceded me on this subject. I wish to found my deductions alone on the facts which they have brought together, and the principles which they have established; making those more particularly my guides, who have paid the closest attention to the natural affinities of the objects they have classed. The materials upon which I work are selected from the labours of those who are most competent to decide on the subject. All that is new is the mode in which these materials are combined.

I must equally premise, what indeed it is almost superfluous to

to observe, that any attempt to exhibit the natural distribution of the groups of ornithology must necessarily, in the present state of our knowledge, be in a great degree defective. Extensive as have been our acquisitions of late years, our knowledge of this department of animal life may still be said to be in its infancy. Were I to assert that we have now attained a satisfactory view of Nature, so far as to enable us to pourtray a complete and finished arrangement of her works, the new forms that are every day pouring in upon us, the very exhibition* at the last meeting of the Society, collected in a hitherto unexplored region by the zeal of one of its most valued members, and placed at its disposal by his liberality, would sufficiently prove me in error. But it is not alone in the knowledge of forms that we are deficient, but in that of the habits, economy, and internal anatomy of many species, nay, entire families, with whose forms we are already conversant. Collectors of natural history are not always men of science; nor have scientific men, even when they become collectors, at all times the leisure or the opportunity of making those minute observations that may determine the natural affinities of the objects that come in their way. This is a deficiency that most frequently baffles the systematic ornithologist, who for the most part has but the external covering of a bird to assist him in ascertaining its place in nature. The bill and legs may indeed decide the more extensive subdivision or order under which it arranges itself; but its affinity to any of the subordinate groups can be pronounced with no certainty, until its internal structure and general economy be ascertained. Hence it arises that some chasms will occasionally occur in the following attempt at a natural arrangement; and many minute

* The exhibition alluded to is the very valuable collection of birds formed by General Hardwicke in Nepaul, and most liberally presented by him to the Linnean Society.

groups

groups will appear, of whose place in nature I must speak with hesitation. But while it must be acknowledged, that some deficiencies will intervene in the chain of evidence by which I would endeavour to establish the existence of a uniform succession of affinities in the feathered creation, it must be equally observed, that there is no contradiction to it. The chasms that occasionally present themselves are such as may be supposed to originate in our limited knowledge of the subject. Time may supply the absent links of our chain, as it has already supplied, and still continues to supply many: and, judging from the past, we need not despair of finding every deficiency filled up from the daily discovered relics of a former world, or the exhaustless recesses of the present.

It has been observed* that, if the natural groups into which the animal kingdom is divided bear a uniform analogy to each other,—a principle which is among the most important of those involved in the system which I wish to illustrate,—it is a necessary consequence that their number should be definite. The primary groups of those departments of the animal kingdom which have hitherto been investigated, have been ascertained to be limited to five; and the first great divisions of birds will be found to branch out into a similar number. The characters of the types of these leading groups are so strongly and distinctively marked, that they could not escape the comprehensive eye of Linnæus, whose tact in seizing upon the grander affinities of natural objects, and bringing them together in their greater groups, has left him without a rival among naturalists. Four of his orders, which possess such distinctive characters as will not admit of their being confounded together, may be at once adopted with some slight modification. The powerful and strongly-hooked

* See "Remarks on the Identity of certain general Laws," &c. &c. by W. S. MacLeay, Esq. in the present volume of the *Transactions*, p. 55.

beaks

beaks and talons; the retractile nails, analogous to those of the typical *Carnivorous Mammalia*; the muscular bodies, the rapacious habits, and animal food of the Birds of Prey (*Accipitres*, Linn., *Raptatores*, Ill.), at once distinguish them from all others. The strong and ambulatorial feet of the Gallinaceous Birds (*Gallinæ*, Linn., *Rasores*, Ill.), adapted to the region where they chiefly resort for their food and the purposes of incubation; their toes and nails peculiarly formed for scratching up the grains and seeds which constitute the main part of their subsistence; their short wings, and the weakness of their pectoral muscles, which cause the heaviness of their flight,—a deficiency which is counterbalanced by the strength of those muscles of the thighs and legs that contribute to their powers of running; their gregarious, and, generally speaking, polygamous habits; the ease with which they are domesticated; their wholesome flesh, together with many striking peculiarities in their anatomy, serve equally to distinguish them. The Web-footed Birds (*Anseres*, Linn., *Natatores*, Ill.) are no less set apart from the remainder of the feathered tribes by the existence of the membrane connecting the toes, which assists them in swimming, and gives them the command over that element whence they derive their food. Their downy bodies serving alike to defend them from the effect of the waters and to buoy them up in their natural element, and the shortness and backward position of their legs, which contribute to their powers in swimming and diving, but incapacitate them from walking on land,—are equally characteristic of their peculiar economy and station in nature. The Wading Birds (*Grallæ*, Linn., *Grallatores*, Ill.) living on the land, but deriving their support from the water,—are no less strongly pointed out by the form of their legs and bills, which are exclusively adapted to their amphibious nature. Their long legs naked above the knee, by which they are enabled to enter

enter the water to a considerable depth in search of their food, —their lengthened toes, stretching out in some instances to an apparently disproportionate extent, by means of which, in addition to the lightness of their bodies, they find a firm footing among the aquatic plants and unstable marshes, where birds of a more contracted foot and a heavier form would necessarily sink, —the length also of their neck and bill, by which they seize upon their food, or draw it out by suction from the above-mentioned situations,—all these characters present incontestible indications of the part they maintain in Nature, and prevent their being confounded with any other of her groups. The two remaining orders of Linnæus, his *Picæ* and *Passeres*, although kept apart by that great master, appear to me to range themselves decidedly into only one group of that degree. In this opinion I am borne out by the assertion of M. Cuvier*, that he can discover no line of demarcation by which they can be separated as distinct orders. There is in fact no character assigned to either of these pretended orders, which may not be equally applied to some groups in the other: while, on the other hand, there are groups in both so nearly allied in affinity, that they cannot be kept far asunder, much less be asserted to possess such distinctive characters as to belong to different orders. The genera *Oriolus* and *Turdus*, Linn., may be cited as examples of this imperfection of the Linnean system; where the true *Oriole* of the former genus is removed from its close affinity to *Turdus*, and placed in a totally remote situation. *Lanius* and *Muscicapa* may be equally adduced as

* "Malgré tous mes efforts, il m'a été impossible de trouver, ni à l'extérieur, ni à l'intérieur, aucun caractère propre à séparer des passereaux ceux des genres compris parmi les *Picæ* de Linnæus qui ne sont pas grimpeurs."—*Cuvier, Regne Anim.* tom. i. p. 335. (note).—M. Vieillot is of the same opinion: "J'ai —— supprimé son ordre *Picæ*, et je l'ai fondu avec ses *Passeres*, vu que les uns et les autres ont une parfaite analogie dans les attributs que m'a fournis le pied, la seule partie que j'aie consultée pour caractériser mes ordres."—*Analyse d'une Nouv. Ornithologie Elementaire.* p. 1.

examples of conterminous families being disjointed from each other by Linnæus, and grouped in separate orders. This is so much the case, that some of the strict adherents to the Linnean classification have actually placed the same bird in different orders at different times, according as they have fancied it to agree with the different characters of these two conterminous genera. For these reasons, and others on which I shall dwell more fully hereafter, I feel no hesitation in deciding with M. Cuvier, that these two Linnean orders may be united into one. The birds that thus compose it may on a first view be considered to be held together, as that distinguished naturalist has also observed, rather by a negative than a positive quality; rather by not belonging to any of the other orders, than by any immediately striking character of their own. But further observations, as we enter more deeply into their details, will evince that they do in reality possess characters sufficient to separate them from their conterminous orders, and to connect them by a continuous series of affinities among themselves. Among these birds will be found the most perfect type of this class of the animal kingdom. The volume of brain is greater among them than in any other order, and their intelligence is proportionally stronger. Many of them are omnivorous: some are endowed with the most powerful vocal organs, and, of all the inferior animals, imitate the human voice with the greatest exactness. In this order also may be observed the birds which apply their feet to the greatest variety of purposes; occasionally using them in climbing, and in taking their food. The foot here, as it were, becomes a hand. It is difficult to give this order a name sufficiently indicative of its character. Neither of the Linnean terms are applicable. We cannot assign the name of *Picæ* to a group which, among other birds equally disagreeing with the title, includes the small and delicately-formed *Warblers:* nor can we, on the other hand, confer the denomination of *Passeres* on a tribe

tribe which contains the *Raven* and the *Hornbill*. I should wish in general to adopt those names which M. Illiger has assigned* to his orders, as most expressive of the typical character of each; but in the present instance, his term of *Ambulatores* is not suitable. In addition to its excluding the tribe of scansorial birds whose feet are not formed for walking, it offers no distinguishing character sufficient to separate the group from the families of the *Gallinaceous* and *Wading* orders, all of which may be said to be walkers, and walkers *per excellentiam*. As the distinctive characters in the other orders are taken from the peculiarities of the feet, and their names consequently derived from that part of their structure, I wish, for the sake of uniformity, to follow the same plan in the present case, and to designate this order by the title of INSESSORES, or PERCHING BIRDS. Some of the extreme genera in the conterminous orders, it must be admitted, approach this character of perching. But this very character by which such genera deviate from the type of their own order, (more particularly in the *Gallinaceous* groups, as will be observed more fully hereafter,) is that which indicates the affinity that unites them with the true *Perchers*. It may also be objected to the above title, that it is not applicable to certain genera in the order, which, strictly speaking, do not perch:—part of the Linnean genus *Alauda*, for instance, the true *Motacilla*, and perhaps the *Pezophorus* of Illiger. But it must be observed that there are no groups, particularly of the more extensive kind, where some of the extreme branches do not depart more or less from the typical character; preserving at the same time some rudiments of it, as is the case in the exceptions just brought forward. Though their habits are not those of the more perfect *Perchers*, their feet are not incapacitated from perching, as we may observe to be the case in the

* The term *Raptatores* of that naturalist I have ventured to alter to that of *Raptores*, which appears to me more classical. The former I believe is not in use.

more distant orders, the *Wading* and the *Webfooted* Birds. On the whole, the term I have chosen appears to me the most comprehensive I could assign, and most expressive of the character which strikes me as prevailing in the type of the order.

There thus appear five great primary divisions or orders of birds, which may be arranged in the following succession:

Pedibus constringentibus ..... Birds endowed with feet formed for grasping.	RAPTORES, or Birds of Prey. INSESSORES, or Perching Birds.
Pedibus haud constringentibus .... Birds endowed with feet incapable of grasping.	RASORES, *Ill.*, or Gallinaceous Birds. GRALLATORES, *Ill.*, or Wading Birds. NATATORES, *Ill.*, or Webfooted Birds.

These divisions deviate in no respect from the long established orders of Linnæus, with the exception of two of his orders having been, as before said, united into one, for which I hope sufficient reason will hereafter appear. As they succeed each other in the above arrangement, they are in like manner found to coincide with the views of our own distinguished naturalists, Messrs. Ray and Pennant, who have arranged the whole class under the primary divisions of *Land* and *Water Birds*; the three first of the above orders constituting that great group of birds which seek their support on land; the two latter forming those groups which derive their subsistence from the water.

We may now proceed to trace the chain of affinities by which these orders are connected together. On turning our attention in the first instance to the *Birds of Prey*, we may expect to find the nearest approach to the *Perchers* among those extreme groups of the former order, which recede the furthest from its typical character; which possess, in short, to a less degree, the habits of rapine peculiar to the raptorial tribes, and less of that power and robustness of structure which characterize the typical birds of the order. The genus *Strix* of Linnæus immediately presents itself as answering this description, where the

the inferior strength of its organization corresponds with the inferior nature of its prey. When we search, on the other hand, among the *Perchers* for that point where they approximate the *Owls*, we at once light upon a group, the *Caprimulgus* of Linnæus, whose general appearance and habits point out the affinity. The nocturnal and predatory manners* of this genus, the hawking flight, the legs feathered to the talons, the large ears and eyes†, the very disk‡ that surrounds the face, and the pectination of the external quill-feathers, observable in some of the species, the general softness of the plumage, together with its peculiarly striking colour and markings, produce a similarity between it and *Strix* that has attracted the eye of the common observer no less than of the naturalist. The provincial names§ of this genus have generally a reference to this resemblance; while the earlier scientific describers‖ of the different species have for the most part ranked them with the *Owls*. I know not whether the singular character observable in some of the species of this family, the serrated nail of the middle toe¶, may not be cited

* "Fures nocturni." *Plin. Hist. Nat.* lib. x. cap. 21.

† "Ces oiseaux ont de grands yeux et de grandes oreilles; comme les *Chouettes*, ils ont la vue offusquée par la clarté du soleil." *Temminck, Man.* p. 436.

‡ "The eyes are surrounded with a disk of feathers, not unlike those of Owls." *Latham, Syn.* vol. ii. p. 591. Art. Jamaica Goatsucker.

§ "Caprimulgus nostras vulgaris et Aldrovandi. Salopiensibus, the *Fern-owl*; Eboracensibus, the *Churn-owl*, a strepitu quem inter volandum edit." *Raii Syn. Av.* p. 26. —The following are common provincial names; viz. Night-hawk, Dorr-hawk, Churn-owl, Goat-owl. See *Montague, Ornith. Diction.* Art. Goatsucker.

‖ "*Noctua* minor ex pallido et fusco varia. *Sloane, Voy. of Jam.* p. 296. *Ulula* Americana ex pallido et fusco varia. *Barr. Ornith. Class* iii. *Gen.* v. *Sp.* 5. *Strix* capite levi plumis griseo-albidis labiorum pilosis. *Browne, Nat. Hist. of Jam.* p. 473. *Strix* sylvatica, major, pulla. *Barr. Hist. Fr. Eq.* p. 147." These are among the synonyms of the *Caprimulgus Jamaicensis* of Brisson.

¶ The common *Barn Owl*, (*Strix flammea*, Linn.,) possesses the same character of serrated *unguis*; and some other species of the *Strigidæ* exhibit somewhat of the rudiments

cited as an additional proof of their approach to the *Birds of Prey*. The strong talons of the latter are lost in *Caprimulgus*: but a construction of similar import (for the serration of the nail appears capable of being applied to the purposes of seizure only) preserves, though faintly, the resemblance. May we not almost venture to affirm, that this apparently trivial appendage is an instance of that beautiful shading by which Nature softens down the extremes of her neighbouring groups—one of those minute and delicate touches by which she marks at once an affinity and a deviation? But while we may discern at a glance the general approximation of these two families, we must at the same time acknowledge that they stand in need of an intermediate link to give them a closer connexion. The weakness of the bill and of the legs and feet of the *Caprimulgus* still keeps it

diments of it; thus establishing still more closely the affinity of the groups under consideration. The conjecture which I have hazarded above, as to the use of the serrated claw,—that is, its being devoted to the purposes of seizure,—receives considerable corroboration from the following observations of an ingenious and diligent inquirer into nature, the late Mr. Gilbert White. "On the 12th of July, I had a fair opportunity of contemplating the motions of the *Caprimulgus*, or Fern-owl, as it was playing round a large oak that swarmed with *Scarabæi solstitiales*, or Fern-chafers. The powers of its wing were wonderful; exceeding, if possible, the various evolutions and quick turns of the Swallow genus. But the circumstance that pleased me most was, that I saw it distinctly, more than once, put out its short leg while on the wing, and, by a bend of the head, deliver somewhat into its mouth. If it takes any part of its prey with its foot, as I have now the greatest reason to suppose it does these chafers, I no longer wonder at the use of its middle toe, which is curiously furnished with a serrated claw." *Nat. Hist. of Selborne*, Letter 37. p. 94.

Mr. Wilson, another accurate observer of Nature, assigns a different use to this serrated claw. When speaking, in his "*American Ornithology*," of the *Caprimulgus Carolinensis*, he tells us that the birds of that species, "reposing so much during the heats of day, are much infested with vermin, particularly about the head, and are provided with a comb on the inner edge of the middle claw, with which they are often employed in ridding themselves of these pests, at least when in a state of captivity." Vol. vi. p. 97. See also vol. v. p. 77. This can be at best but an accidental use to which

it at some distance from the *Owls*, in which the same members are comparatively strong; while the wide gape of its mouth serves to divide the families still further*. A connecting link has been however supplied by an Australasian group, the *Podargus* of M. Cuvier, which harmonizes these discrepant characters. We have an opportunity of observing among the specimens in the collection of the Society, how far the bill of this extraordinary genus combines the different forms of that of the two genera, and how far the legs, still maintaining the characteristics of *Caprimulgus*, such as the unequal length of the toes, are related to those of *Strix* by their superior robustness. Here, indeed, there is a beautiful gradation of affinities. All the front toes of *Caprimulgus* are united by a connecting membrane as far as to the first joint: those of *Strix* are divided to the origin; while those of *Podargus* partake of the characters of both, in having the middle toe connected

which the serration can be applied. There are many other groups of birds, possessing the same character, to which the same application of it can never be assigned. We may observe, for instance, that the greater part of the genus *Pelecanus* of Linnæus possess this character. This group of the *Natatores* meets the *Birds of Prey*, as we shall have occasion to observe hereafter, on the opposite side of that circle which embraces the whole class: and thus on both sides of the order we find a similar construction in the groups immediately approaching it. Many of these birds, whose feet are naturally ill adapted by their webbed structure for laying hold of any object, are yet found to incubate among trees, where the serrated claw may give them a firmer power of prehension: they are also asserted to seize their prey occasionally by the foot; in which act the structure of the nail, as in the case cited from Mr. White respecting the *Caprimulgus*, may be peculiarly useful.—See p. 418. Notes * and †. The family of *Ardeidæ* among the *Wading Birds* equally exhibit an analogous construction in the middle nail. Here, again, this character seems adapted to their mode of life in enabling them to hold their prey more firmly in those slimy and muddy situations where it might otherwise elude them: while, at the same time, it may assist their feet, (which, like those of the *Pelecanidæ*, are naturally ill suited for grasping,) in their hold among the trees, where, like some also of the latter family, they build their nests.

* "*Rostro* minimo nigro, *Rictu* oris ingenti, *Pedibus* brevibus exilibus ab aliis quibuscunque Noctuis abunde distinguitur." *Raii Syn. Av.* p. 27.

with

with the outer, but divided from the inner. Again, as I have already remarked, *Caprimulgus* has the nail of the middle toe dilated and serrated: *Strix* has it, generally speaking, undilated and entire at the margin: but in *Podargus* the same part displays the singular dilatation of the one, and the marginal integrity of the other. It is difficult to say to which of these groups it comes nearest, until further and more accurate accounts than we at present possess of its food and economy may determine its actual situation. At present* it remains osculant between the two families, and may decidedly be pronounced the immediate passage from the *Birds of Prey* to the *Perchers.*

The family of *Columbidæ*, alternately arranged by systematic writers among the *Perching* and *Gallinaceous* orders, and not unfrequently grouped as a separate order between the two, at once indicates where the point of junction exists between them. These birds, although we have the high authority of Linnæus for uniting them with that division of our *Perchers* which form his *Passeres*, I do not hesitate in arranging, conformably to the opinion of MM. Cuvier and Illiger, as a subdivision of the GALLINACEOUS BIRDS. In those particulars, where they respectively assume the character of each order, their affinity with the latter is considerably stronger than that which approximates them to the former. Their food and habits, their internal economy, and the formation of their bills, identify† them with the *Rasores.* While, on the other hand, the characters which bring them near

* From the accounts which I have latterly been enabled to obtain from actual observers of some of these birds in New Holland, their manners are generally conformable to those of the *Caprimulgi.*—Nov. 1824.

† "Comme les premiers (les *Gallinacés*) ils ont le bec voûté, les narines percées dans un large espace membraneux et couvertes d'une écaille cartilagineuse qui forme même un renflement à la base du bec; le sternum osseux profondement et doublement échancré, quoique dans une disposition un peu differente, le jabot extrèmement dilaté, le larynx inférieur muni d'un seul muscle propre." *Cuvier, Regne Anim.* i. p. 454.

the

the *Insessores*, their divided toes and comparatively short legs, are weakened by the resemblance which those members bear to the same parts of the contiguous order in their general structure, and more particularly in the bluntness of the nails, so strongly indicative of the rasorial* habits of the *Gallinaceous* tribes, and so strikingly contrasted with the sharpness of the nails in the Linnean *Passeres*. They are much more nearly allied to these latter tribes by their habits of perching and building their nests in trees or rocks, by the absence of the spur on the legs of the male, and by the inferior number of their tail-feathers. But these characters are equally found in a group of birds, confessedly gallinaceous; namely, the genus *Crax* of Linnæus, which meets them at the opposite extremity of that order. Such points of resemblance, in fact, although not sufficiently strong to assign them a place among the *Perchers*, are yet sufficiently

* The family of *Columbidæ* is one to which I have of late paid particular attention, and in the details of which I have found a singular affinity with the other *Rasores*, that will not admit of their being disjoined from each other. The nature of my present observations, too general to allow of my descending into particulars, prevents my dwelling on the subject at present. I shall, however, extract a reference or two from a popular work of the first authority, to evince the approximation in manners to which I allude. Dr. Latham, speaking of the *Columba Nicobarica*, observes: "It is a heavy bird, with rounded wings, and keeps on the ground in the manner of other poultry, and like them feeds on grain, but occasionally eats insects and all kinds of worms; will mix with other poultry, and roost with them on the trees at night: *they fly heavily* and *not a great way at a time*, but *run on the ground sufficiently fast*." *Syn.* vol. viii. p. 85. ed. 2.—Of *Columba carunculata* he says: "Its nest is made on the ground. The young as soon as hatched are covered with grey down, and keep with their mother, who covers them with the wings like a hen: these keep all together till they pair for a new brood; in this, following the nature of other gallinaceous birds. The young run on the ground like partridges, and the old ones call after them as a hen does her chickens." *Ib.* p. 86.—Of *Columba passerina*: "Sloane mentions that these birds feed on the ground as partridges, and spring as they do, taking a short flight, and again alighting on the ground." *Ib.* p. 92. These quotations will be sufficient to direct the judgment of those who may be inclined to form their opinion of the manners of the *Columbidæ* from those of our European species.

decisive of their affinity to them; and it is by means of these characters that the passage from one order to the other is preserved. If we now look among the *Insessores* for that tribe which approaches most closely to the *Rasores*, we may select the singular African family consisting of the genera *Musophaga* Isert, and *Corythaix* Ill., which the accurate hand of M. Cuvier has already marked out as uniting the two orders. The internal structure of these birds, at least of the latter genus, has been decided* by that discerning anatomist to be the same as that of the *Perchers*; and from their toes being arranged in pairs, although like those of many of the same tribe they are said to be retractile, they may be assigned a place among his *Grimpereaux*, or our tribe of *Scansores*. Their food and habits, and indeed their general appearance, on the other hand assimilate them to the *Rasores*. The well-known genus the *Touraco* of M. Le Vaillant approaches some species both of the *Cracidæ* and the *Columbidæ* by its bill; while the tail and wings of both *Musophaga* and *Corythaix* exhibit the exact form of the former family, or of the Linnean genus *Crax*, which meets the family of the *Pigeons* at the opposite extremity of the *Gallinaceous* order. It is consequently at this point of junction between the families of *Columbidæ* and *Cracidæ*, by means, as we shall see hereafter, of the genus *Penelope* of Merrem, that the second and third orders appear to be naturally connected.

In pursuing the same line of inquiry, and exploring the passage from the *Gallinaceous* to the *Wading* orders, we may remark a striking character in one of the groups of the former, which immediately suggests the union between them. The tribe of *Cursores* of Illiger have their affinity to the *Wading Birds* indicated by the length of their legs and their nakedness above the

* " Leurs narines sont aussi simplement percées dans la corne du bec,—et le sternum (au moins celui du *Touraco*) n'a pas ces grandes échancrures ordinaires dans les gallinacés."—*Regne Anim.* i. p. 435.

knees:

knees: while their habits, entirely terrestrial, and for the most part confined even to arid situations, keep them apart from those birds which affect the neighbourhood of waters. They are met, on the other hand, by a group among the *Grallatores*, the family of *Gruidæ*, which, though decidedly *Waders*, and living in moist places, have their food more vegetable, and their habits more terrestrial, than the other families of the same order*. The *Gruidæ* also may be observed to retain that peculiar looseness and delicate texture of plumage which are conspicuous in the gallinaceous tribe, from which they immediately recede, and of which the *Struthio* of Linnæus may be considered the type. In that singular genus by which we enter among the *Waders*, the *Psophia* of Linnæus, this affinity is obviously discernible. In form and plumage it at first sight appears an *Ostrich* in miniature; while it retains the brilliancy and changeableness of colour natural to the gallinaceous tribes, but so distinct from the sober hues of the *Waders*, that it alone of the order is found to possess them. I feel some hesitation indeed in saying to which order it actually belongs, until dissection determines the point. As yet the accounts we have of its manners, although not sufficiently satisfactory, would induce us to rank it with the *Gruidæ*, to which its habit of standing in its sleep on one leg and drawing in its head between its shoulders, seems particularly to assimilate it. It may here be added, that the family of *Charadriadæ*, which meets the *Gruidæ* at the other extremity of the order of *Grallatores*, bears a considerable affinity to the *Struthionidæ*, or cursorial subdivision of the gallinaceous birds, in the conformation of their feet. Both are distinguished from the remaining families of their respective orders by the absence of the hinder toe; a character which may be observed to be carried to a still

* "Leurs habitudes sont plus terrestres, et leur nourriture plus vegetale que celle des genres suivans. Aussi ont elles un gésier musculeux et des cæcums assez longs."—*Cuvier, Regne Anim.* tom. i. p. 471.

greater extent in the type of the *Struthionidæ*, where one of the front toes is also deficient. This character, which indicates the habit of running, brings the *Charadriadæ* in a natural arrangement into close contact with the *Struthionidæ*. So that we may at once decide that the passage from the *Gallinaceous* to the *Wading* order takes place at that point where the two extreme subdivisions of the latter are united, as we shall shortly observe, by the genera *Œdicnemus* of Cuvier and *Psophia* of Linnæus. The genus *Otis*, Linn. seems to be the group among the *Rasores* that immediately meets them.

The two conterminous orders, *Grallatores* and *Natatores*, forming, when united, a division of the entire class, which may be entitled *Aquatic Birds*, it may readily be concluded that they approach each other by such gradations as render it no easy task to fix the exact limits of each. This is so much the case, that the most obvious characters of each order are in many instances transferred to groups of the other. Thus we find the webbed feet of the *Natatores* among birds which do not swim, as, for instance, the *Recurvirostra*, Linn., and *Phœnicopterus*, Linn. On the other hand, we have groups which do swim, such as the genera *Rallus*, Linn., *Gallinula*, Briss., and *Hæmatopus*, Linn., and which yet possess the divided toes of the *Grallatores*. Again, we may observe other Swimming Birds, such as the lobated *Fulica*, Linn., and *Phalaropus*, Briss., the feet of which may be said to be neither webbed nor divided, but to partake of each character. Various modes of classing these birds have consequently been adopted by systematic writers. Linnæus has placed the before-mentioned genera *Phœnicopterus* and *Recurvirostra* among his *Anseres*, or our *Natatores*. But the character of their webbed feet is neutralized by the extreme length and forward position of their legs, which totally prevent their swimming: and these latter characters, together with the nakedness of their thighs and their habits of life, decidedly place them among the *Grallatores*.

To

To these birds we shall hereafter observe them united by intermediate genera, which partake in a lesser degree of the character of the palmated foot. In fact, the webbed feet of the *Flamingo* and *Avocet* appear to me to connect them with the *Natatores* by a relation of analogy rather than of affinity. These birds are the extremes of the groups to which they belong. Both deviate from the habits of their own tribes, by gaining their sustenance on the sea-shore or at the mouths of great rivers, and thus become more pelagic in their manners than their congeners. It is not, consequently, to be wondered at, that they should assume a conformation in a subordinate degree analogous to that of the true oceanic birds, to whose sphere of life they approach. These two groups being on the whole so widely different in their chief characters, it is not among them that we may expect to find the passage between the two *aquatic* orders. We shall perceive it more strongly indicated by the lobate-footed *Fulica*, which recedes from the *Grallatores* and approaches the *Natatores*, not only by the rudiments of the web that partially fringes the toes, but by its habits of swimming. I cannot, however, agree with the views of those writers, who place this genus among the true *Natatores*, and form it into a subdivision of that order in conjunction with the genera *Phalaropus* and *Podiceps:* much less can I accord with that disposition which places these three groups, so dissimilar in manners, and even in the construction of the foot*, in a separate order of their own. *Fulica*, in a natural

* I know no two birds in which the construction of the foot, and the use to which it is applied, is more dissimilar than in *Fulica* and *Podiceps*, although they certainly belong to approaching groups. *Fulica* has the true *ambulatorial foot* of the *Grallatores*, with the rudiments of a web that exhibit a partial deviation from that order and an approach to the swimming powers of the *Natatores*. *Podiceps* has a true *natatorial* foot, and one in which the powers of swimming and diving are strongly developed, as will appear in the course of the succeeding observations. The hind toes of both these genera are totally unlike: while the different position of their legs evince the extreme distance between their respective stations among the birds that swim; one group belonging to the

natural arrangement, cannot be placed in a different family from *Gallinula*, nor *Podiceps* in a different one from *Colymbus*. It is not easy, I must confess, to draw a decided line of partition between orders so closely assimilated as the *Grallatores* and *Natatores*. Perhaps the plan most accordant with nature would be to divide the above Aquatic Birds, according as they frequent the fresh or inland waters, or generally inhabit the ocean. The approaching groups of each division would of course partially encroach upon the domains of the other; and while the extremes of the oceanic birds would be occasionally found in inland stations, those of the grallatorial birds would sometimes, on the other hand, gain their support from the ocean, but on the sea-shore, or not far distant from land. Such a view would go far to restore the genera *Fulica* and *Phalaropus*, whose station has been so often disputed, to their original place among the *Waders*, where they were arranged by Linnæus. We may thus observe, that the family of *Grallatores*, which approaches the *Natatores* by their swimming habits, will lead on in a regular succession from *Rallus*, Linn., to *Gallinula*, and *Porphyrio*, Briss.; thence to *Fulica*, Linn., and *Podoa*, Ill.; which last genus exhibits a striking approach, in the general construction of its neck, body and tail, to the family of *Anatidæ*, that forms one of the extremes of the *natatorial* birds. Some of these, on the other hand, as the genus *Anser*, evince in the length of their neck and *tarsi* and the forward position of their legs, together with a greater compression of bill than is found among the *Anatidæ* in general, a corresponding approach to the *Rallidæ*, or extreme subdivision of the *Grallatores*. The genus *Ce-*

the typical oceanic or true swimming and diving birds, the other to those which barely approach them. The system which, without regard to their general structure, unites these discordant groups into one, and separates them from all other birds,—merely because the webs that border the toes, although not even similar in construction, (for in one group they are emarginated, in the other entire,) *are not united*,—is the most artificial with which I am acquainted.

reopsis

reopsis in particular evinces still more this affinity. Here the thighs are naked above the knee, as in the genuine *Waders*. And this character, as well as many other particulars in its appearance in general, so far connects it with both orders, as to have caused different systematic writers to place it in each. It may here be observed, that the genera which compose the natural family of *Rallidæ*, are closely allied to the *Hæmatopus*, Linn., which commences the adjoining subdivision of the *Waders*. They are also brought, by means of the circular disposition, which I shall dwell upon more fully hereafter, into immediate contact with the *Tringa* of Linnæus, which terminates the family that precedes them. Here, by means of the lobated feet, they are connected with *Phalaropus*, which I arrange, as one of the extreme groups of the *Scolopacidæ*, close to the genus *Tringa*, where they were placed by Linnæus, and in which situation they are still retained by M. Cuvier. The whole of the swimming birds, therefore, which are to be found in the *Wading* order, are thus brought into contact and united by uninterrupted links of affinities.

We have now arrived at the fifth and last division of Birds, and have only to trace its connexion with the first, in order to complete the circle in which the orders have been asserted to be united. The difference between the types of the *Raptorial* and *Natatorial* groups is at first view as great as can be imagined. Frequenting different elements, and performing totally opposite functions in nature, they can scarcely be conceived capable of being brought within a common sphere of action; while the extreme discrepancy in the structure of their feet renders it at first sight difficult to conjecture how any modification of it can bring them into contact. These difficulties, however, vanish on a nearer inspection, and we find a gradual approximation take place between these apparently discordant groups, similar to what

what has been before observed between the other orders. It is naturally to be supposed that those oceanic birds, which are likely to approach most closely to the raptorial tribes, are to be found among the extremes of the *Natatores*. And in tracing the gradations by which the natatorial families recede from those which may be considered typical of the order, we may perceive in the genus *Pelecanus* of Linnæus an evidently approaching affinity to those birds whose feet are formed for grasping. The greater part of this family, although generally resorting when on land to rocky sea-shores, and forming their nests among rocks, are yet occasionally accustomed both to perch and incubate among trees*. Unlike all the other webfooted tribes, they are equally asserted to make use of their feet in laying hold of their prey†. And I cannot here pass over the striking circumstance of the *Cormorant* having been formerly used for fishing‡, in a similar manner to that in which hawks are used by falconers on land; and of a species of the family, the *P. Sinensis*, being trained by the Chinese for the same purpose. In two genera of this family, the *Phaeton*, Linn., and the

* "Quamvis palmipedes sunt (sc. Onocrotali) et mole corporis maximâ, *arboribus insident in iisque nidificant*, teste *du Tertres* in *Hist. Nat. Ins. Antill.*, quod et Corvi aquatici et Graculus palmipes, *nostrâ experientiâ*, faciunt, et reliquæ fortasse hujus generis aves."—*Raii Syn.* p. 122. "Ces Oiseaux (les Cormorans) sont excellens nageurs: quoique tous les doigts se trouvent engagés dans une même membrane, ils sont doués d'un moyen de prehension très-extraordinaire dans des oiseaux à pieds palmés, en ce qu'*ils perchent souvent sur les arbres*."—*Temminck, Man. d'Ornith.* p. 890. "La famille de *Totipalmes* a cela de remarquable, que leur pouce est reuni avec les autres doigts dans une seule membrane, et malgré cette organisation qui fait de leurs pieds des rames plus parfaites, presque seuls parmi les palmipedes, *ils se perchent sur les arbres*."—*Cuvier, Regne Anim.* i. 522.

† "Gesner reports that *the feet do* sometimes *serve them* (the Cormorants) *to catch the fish*."—*Pitfield, Nat. Hist. of Animals*, p. 135. "In passing, he (the Frigate Bird) takes up the little fish either with his bill *or talons*."—*Albin*, iii. 75.

‡ See *Penn. Brit. Zool.* vol. ii. p. 283. ed. 8vo. 1812.; and *Willoughby, Orn.* p. 329.

Tachypetes,

Tachypetes, Vieill., we find a still more immediate approach to the *Birds of Prey**, in their raptorial habits, their soaring and aërial flight, and the rapid seizure of their prey without immersing themselves in the waters whence they seek it. The last-mentioned genus, *Tachypetes*, in particular, exhibits in its general habits and structure the most conclusive evidence of this affinity, and of its deviation at the same time from the *Natatores*. Although for the most part it pursues its habits of rapine at immeasurable distances from the shore, and derives its support exclusively from the ocean, it is never known to rest upon its surface. It does not possess in fact, to a sufficient extent, those glands which by their oily secretions preserve the plumage of other oceanic birds from the effects of the water; while the extreme disproportion of its hinder extremities deprives it of the power of either swimming† or walking. On observing the structure of its legs we immediately detect this deficiency. Short, weak, and feathered down to the toes, they are equally unsuited to the land and the water. Its powers of motion and the characters by which it maintains its station in nature are in fact centered in its wings. Supported in its unlimited flights by the strength and expansion of these members, and aided by the singular mechanism of its tail and the buoyant nature of the inflated sac which distends its throat, it seems to be an inhabitant of the air, rather than of the land where it resorts alone for the duties of its nest, or of the water over which it only hovers for its prey. These extraordinary and strongly marked characters, by which it thus appears as it were to fluctuate between the confines of the two

* *Fregata* avis —— Oculi nigri, acie acutissimâ et *Aquilinâ*.—Pedes breves; ungues *Vulturini*.—A ramis arborum in quibus resident difficulter admodum se levant: verum cum semel in sublime evolârunt, motu placido absque ullâ fere alarum agitatione aërem tranantes videas velut fluxu aut lapsu quodam, *ad instar Milvorum*.—*Raii Syn.* p. 153.

† See *Linnean Transactions*, vol. xiii. p. 3.

orders before us, did not escape the penetrating eye of Linnæus, who, by the name of *Pelecanus Aquilus* which he assigned it, pointed out at once its place among the *Aquatic* birds, and its vicinity to the *Aquiline*. It is by no means so easy to determine the point where the *Raptores* meet it, as to detect its own general affinity to that order. We know, perhaps, less of the raptorial tribes than of any order in the whole class, notwithstanding the importance of their size and the prominency of their habits. Several groups in particular, of which we have very unsatisfactory descriptions, are known to exist in the New World. In this imperfect state of information,—having had few opportunities of examining any of these birds in question, or of judging of them by so accurate a description as we fortunately possess of the *Tachypetes*,—I hesitate to decide with any confidence, where I can only speak from conjecture. All that I shall at present insist on is, the general approximation of these two leading groups. They evince a decided affinity in the more important of their habits and characters; and I make no doubt that, when our knowledge of the *Raptorial* order becomes more enlarged and defined, we shall find the chain of affinities as perfect in the minuter particulars that connect these groups, as it is between the other similar divisions of the feathered race.

ON THE FAMILIES OF BIRDS.

Ord. I. *RAPTORES.*

In descending from the consideration of the more extensive divisions or orders of Ornithology to that of the next succeeding subdivisions, we are naturally led to the consideration of the families of the *Raptores*, the first of the two orders that form the normal or typical group of the class. And here I have to regret that

that the tribes which meet our earliest attention are those respecting which our information is most deficient; and where, consequently, we must feel most hesitation in deciding on the affinities which connect them, and the subdivisions into which they branch out. I shall not therefore at present dwell at much length upon this order, but shall content myself with a few brief observations, more particularly on such of the groups as containing European species, and being of course more open to examination, may be spoken of with some degree of confidence.

There are three important groups in this order, which form distinct and prominent subdivisions of it; the families of *Vulturidæ*, *Falconidæ*, and *Strigidæ*, corresponding with the Linnean genera *Vultur*, *Falco*, and *Strix*. To these may perhaps be added a fourth group, the *Gypogeranus* of M. Illiger, which, though it has sometimes been disposed in a different order, is now, I believe, generally admitted to be a *Bird* of *Prey*. In this arrangement I feel every disposition to acquiesce. The essential characters observable in the structure of the *Gypogeranus* accord accurately with those of the *Raptores*; and it bears a resemblance to the *Grallatores*, among which it is sometimes arranged, only in the length of its *tarsi*. But in judging by such insulated characters, however striking or important, as only indicate a similarity between groups not otherwise connected together by equally essential particulars, it becomes necessary to consider whether the conformity of these characters may not be the result of a conformity in habit or situation, which may incidentally assimilate the groups in which they are found, rather than of a natural affinity that determinately unites them. In other words, we ought to reflect whether an analogous mode of life or an analogous place of resort may not give rise to a partially analogous conformation. In the present case, the sandy and unsubstantial nature of the plains which these birds frequent, appears to me to demand

a corresponding structure with that required by the moist places which form the ordinary resort of the *Waders*: and the *Bird of Prey*, that pursues its reptile food over the loose and unstable footing of the desert, seems to stand in need of a length of limb equal to that which is necessary for the *Wader* among the marshes. Other instances occur of an analogous provision of Nature. The *Ostrich*, whose chief abode is among the barren plains of the torrid zone, is endowed with a similar length of limb: and the *Giraffe*, that tallest work of the animal creation, is exclusively confined to the limits of the same sandy regions. While on this subject, it may also be observed that the legs of the *Gypogeranus*, although similar to those of the *Waders*, are not the same with them in structure. Those of the former bird are plumed, like the legs of the *Raptores*, as far as to the knee; while in the *Wading Birds* they are devoid of feathers: the dry nature of the sands not requiring the same nakedness of limb in the one group, which the moistness of the marshes renders necessary in the other. The genus *Gypogeranus* is at present composed but of one species, the well-known *Secretary Vulture* of the Cape. But judging from its structure and habits, and the adaptation of both to the arid nature of the plains which it frequents, it appears probable that some congeneric birds may exist in the hitherto impenetrable deserts of that vast continent, on the outskirts of which this solitary species is found. I have some doubts also whether a part of the raptorial birds which have been noticed in South America may not be allied to this genus. M. Illiger alludes to some Brazilian *Falconidæ* with long *tarsi*, which do not seem to have met with much attention, or to have been very accurately described. These may perhaps be found to fill up part of the vacancy which at present exists in our series of affinity. But all this is mere conjecture; and it is useless to hazard observations which only tend to expose the narrowness of our information,

tion, and the insufficiency of the *data* which are afforded us on such points, for forming any decisive conclusions.

If we admit the *Gypogeranus* among the *Raptores*, we may arrange it, I conceive, next the *Vultures*, to which family it bears a nearer affinity than to the *Falconidæ*, in its naked cheeks and the looseness of the plumage about the head. The construction of the feet also brings it more close to the *Vultures*, while the comparative straightness and bluntness of its toes distinguish them from the hooked and pointed talons of the *Falcons*. The greater developement of the membrane which connects the toes affords an additional reason for placing it near the *Vulturidæ*. Its natural station, therefore, appears to be immediately preceding this family, from which indeed it seems only to deviate in the length of its *tarsi* and its reptile food.

Passing on now to the succeeding families of the order,—the affinity between the *Vulturidæ* and *Falconidæ* may with equal confidence be asserted, from the circumstance of several species of each being indiscriminately arranged in both families by different systematic writers The external characters of these neighbouring groups are indeed considerably blended together. The long bills of the *Vultures*, straight at the base and hooked only at the point, pass over into many groups of the *Falconidæ*; while some species of the latter family, which from their manners cannot be separated from it, exhibit the naked face and loose plumage that characterize the *Vultures*. Of this, the *Falco Novæ Zealandiæ* of Dr. Latham affords a notable instance; and more particularly his *Falco Braziliensis*, another of the Fishing Eagles, forming the genus *Polyborus* of M. Vieillot, where the throat is devoid of feathers, as well as the cheeks. The genus *Gypaetus* of Storr, of which the *bearded Vulture* of the Alps presents the type, appears to form the connecting link between the families. Here, not merely the details of the bird's structure partially correspond with those of the conterminous groups, but in manners also

also it agrees with each; the bird being occasionally observed, like the *Vultures*, to feed upon carrion, and at other times, like the *Falcons*, to pursue a living prey.

If we search in the last place for the connexion between the *Falconidæ* and the *Strigidæ*, we shall not fail to find their affinity apparent, as is usual, in the less typical part of the two groups. In the latter family some species may be observed gradually approaching the *Falcons* in their diurnal habits and the lateral position of the eyes; and at the same time deserting their own congeners in losing the large orifice to the ear, the disk that surrounds the face, and the egrets that decorate the head of the type of the family. The genus *Surnia*, Dumer., which includes the "*Chouettes Eperviers*" of the French naturalists, is the most accipitrine of the group. In addition to the approximation already pointed out, the bill and tail of this genus, more lengthened than those of the *Owls* in general, give it a still stronger resemblance to the *Falconidæ*. The group of *Buzzards* among the latter family appears to come most closely to the *Owls*, in their slow and heavy flight, the softness of their plumage, and their slothful and cowardly habits. The genus *Circus* of Bechstein in particular, of which our *Hen Harrier* gives a familiar example, may be observed to possess a peculiar elongation and erection of the face-feathers, which bears some resemblance to the disk that encircles the face of the *Strigidæ*, and it may therefore be particularized, from among those groups, at least, which are most known to us, as exhibiting the nearest approach to *Surnia*.

There is thus little difficulty in selecting the four families just mentioned for the purpose of filling up the place of four of the subdivisions of the *Raptores*; and in all probability, when the order comes to be more perfectly and accurately understood, these families will be found to be connected together in the succession in which they have now been examined. A fifth subdivision as yet is wanting. That there is room however for such an additional group,

group, may be inferred from the intervention of so great a chasm as that which separates the *Strigidæ* from *Gypogeranus*, and indeed from every other known group of the order, except the *Falconidæ*, with which it has been seen to be connected on one side. It may also be observed that it is near the point where this chasm occurs that we may look for the group which immediately meets the *Tachypetes* and the Natatorial families; the general approximation of which to the *Raptores* we have already remarked, although the immediate point of junction between them could not be determined. Whether such a group may be discovered among those birds which have already been noticed by voyagers, but which are vaguely and imperfectly described; or whether it may exist, hitherto entirely unknown, in the heart of those regions which the eye of science has not yet explored,—is a point on which we can of course at present only speculate, without any more solid foundation than conjecture. I shall therefore reserve all further observations on the subject, until more extensive opportunities and more accurate examination, than I can at present have recourse to, will enable me to lay more decisive results before this learned body; and I shall now merely suggest the following attempt at arranging these families according to their affinities.

Structurâ magis ad rapinam idoneâ; prædâ superiore.	*Vulturidæ.* *Falconidæ*, Leach.
Structurâ minus ad rapinam idoneâ; prædâ inferiore.	*Strigidæ*, Leach. . . . . . . *Gypogeranidæ?*

Ord. II. *INSESSORES.*

The order of *Insessores*, which next attracts our attention, contains, as is usually the case in typical groups, a considerably greater

greater number of forms than are to be found in any of the other orders. The families of which it is composed are consequently very numerous, and require to be classed in comprehensive sections, or, as I shall call them, tribes, which form the primary subdivisions of the order. These tribes may be denominated as follows, according to the habits or the modes of structure that characterize the birds which compose them:

**Fissirostres*, Cuv.
Dentirostres, Cuv.
Conirostres, Cuv.
Scansores, Auct.
Tenuirostres, Cuv.

* In enumerating or describing the groups which compose different series of affinities returning into themselves, it is of no consequence with which group in the series we begin our examination, provided we preserve an uniformity among the whole of our corresponding series. This consideration, however, should be particularly attended to, for the sake of more easily discerning their parallel analogies. It is generally my custom, in examining a group, to view it with its more perfect or typical form in the centre, as above, and with its less perfect forms on each side. This mode affords some advantage, by presenting us at first sight, when we enter upon a group, with that subdivision of it which is immediately connected with the group we have quitted. Mr. W. S. MacLeay in his "*Horæ Entomologicæ*" has adopted a different, and certainly a more scientific mode of exhibiting the series of affinities. He divides the whole series into two groups, which he calls *normal* and *aberrant*; and, commencing with the two subdivisions that form the normal group, he ends with the three that compose the aberrant. For the more entire comprehension of my subject, I shall exhibit the different series that come before us according to both these methods, adopting that method in the notes which has not been followed in the text. The following is the arrangement of the *Insessores* according to Mr. MacLeay's plan of exhibiting a series of affinities.

Normal group.
Rostri pedisque structurâ magis perfectâ . . . . . { Dentirostres. / Conirostres.

Aberrant group.
Rostri pedisque structurâ minus perfectâ . . . . . { Scansores. / Tenuirostres. / Fissirostres.

§ I. Fis-

§ 1. Fissirostres.

The families which compose the first tribe are distinguished from those of all the others, except the *Tenuirostres*, by their habit of feeding on the wing. From the latter, or the *Suctorial Birds*, which meet them at one of the extremes of the tribe, and of which the typical families feed also on the wing, they are distinguished by their animal food, which they take by their bills, or in the gape of their mouths; while the *Tenuirostres* live chiefly upon vegetable juices, which they extract with their tongue. The *Fissirostres*, depending so much on the powers of their wings, exhibit a proportional deficiency in the strength of their legs. These members are not only shorter and weaker than in the other *Perchers*, (the typical families of the *Tenuirostres* here again being excepted, which correspond with them in this particular also,) but they have their external toes in general to such a degree united with the internal,—for the most part as far as to the second phalanx,—that they are deprived of the free play of the joint: and the bird is thus rendered nearly incapable of using its legs in walking, or for any purpose besides that of mere perching. But even in this particular a group of the typical family appears deficient: for the toes of the genus *Cypselus* being all placed in front, seem to assist the bird only in suspending itself, where other birds would perch. All the families of the tribe are again united by a striking conformity in their mode of nidification. They deviate from the manners of the *Perchers* in general, in forming their nests on the ground; or if, like some of the *Hirundinidæ*, they choose elevated situations for that purpose, they build up the exterior of their nests with earth cemented into a solid substance, and thus preserve a similarity in their construction to those nests which are actually formed on the ground. The two typical groups of this tribe may be observed to be separated from the other three by the shortness of their bills and the wider gape of the mouth.

Their mode of seizing their prey is conformable to these characters: they receive it in full flight into the cavity of their mouths, which remain open for that purpose, and where a viscous exudation within, and a strong reticulated fence of *vibrissæ* on the exterior, assist in securing the victim: while, on the other hand, the longer-billed families catch their food by their bills. The series of succession in the tribe may be stated* as follows, the typical families being placed in the centre:

Meropidæ.
Hirundinidæ.
Caprimulgidæ.
Todidæ.
Halcyonidæ.

The family of the *Meropidæ*, to which we may first turn our attention, as that group of the present tribe, which by the length, slenderness, and downward curvature of the bill, is most nearly connected with the conterminous tribe of *Tenuirostres*, exhibits at first sight a decided discrepancy with the succeeding family of *Hirundinidæ*, where the bill is short and wide: and if we examine only the typical species of each, we must admit that, in respect to these particulars, there is a manifest distinction between them. Independently, however, of the general characters in which both families approach each other, such as the breadth of the *rictus* of the bill, the short and feeble legs, the strength of the wing, and the consequent habit of using that member chiefly in seeking their support,—we find a gradual approximation take place even in their bills: those of some of the extreme species of

* Or thus, with reference to their typical and aberrant characters:

Normal group.
Rostris brevibus, debilioribus, ad captandum haud idoneis . . { *Hirundinidæ.* / *Caprimulgidæ.*

Typical group.
Rostris longis, fortioribus, ad captandum idoneis . . . . . { *Todidæ.* / *Halcyonidæ.* / *Meropidæ.*

Merops

Merops becoming shorter as they approach *Hirundo*; while those of some of the latter group partially desert their own type, and by degrees assume the lengthened form of the bill of the *Bee-Eaters*. The tail of *Merops*, again, is equally found to desert the typical character of the group, namely, the greater length of the two middle feathers, in order to become even in some species, then slightly forked, and at length to be identified with the fully-forked tail of *Hirundo*.

In continuing to trace out the same line of affinities between the succeeding groups, it is unnecessary to enter into a detail of those characters which unite the two families of *Caprimulgidæ* and *Hirundinidæ*. The union between them in the most essential particulars, in their habits, economy, and general conformation, is too evident to the common observer, and too universally acknowledged by scientific writers, to need any further illustration. It is gratifying, however, to observe, how even in minute particulars a gradual succession of affinities imperceptibly smooths the passage between conterminous groups; and I cannot pass over without remark, the circumstance of the hind toe of *Caprimulgus* being usually retractile, which enables it to place all its toes in front, in a similar position to that which they maintain in *Cypselus*, where the family of the *Hirundinidæ* terminates. The conformation of the tail in the two families shows a similar affinity. Some species of *Caprimulgus* lately arrived from Brazil, exhibit the forked tail of *Hirundo*, one of which indeed, the *C. psalurus* of M. Temminck, has this character developed to an almost disproportionate degree.

Leaving those typical families with the short bill, and taking a general survey of the tribe, we may perceive that the *Caprimulgidæ* unite themselves to the longer-billed families by means of the Linnean *Todi*, which preserve the broad base of the bill of the latter, but lead on by the comparative length of that member to the succeeding family of *Halcyonidæ*. If we compare the bill of

the type of the last-mentioned genus, the *Todus viridis**, Linn., with those of *Caprimulgus* and *Halcyon*, we shall perceive that it stands exactly mid-way between them in the relative proportions of strength and breadth which it bears to each. In the length also of the tail, an important character in the groups that feed much upon the wing, it maintains a middle station between them. For the group which forms the immediate connexion between the present family of *Todidæ* and the preceding *Caprimulgidæ*, we are indebted to the zeal and scientific acumen of one of the most distinguished members of our Society; since in the depressed and broad-based bill and wide gape of the *Eurylaimus* of Dr. Horsfield, we recognise the characters which unite the families before us. The intimate approach of the bill of this latter genus to that of *Podargus*, which meets it among the *Caprimulgidæ*, may be at once ascertained by a reference to the valuable plates† of the "*Zoological Researches in Java*," in which both genera are figured. Near to *Eurylaimus*, which is united to *Todus* by some species now referred to the former genus, but which were originally included in the latter,—among which *T. nasutus* of Dr. Latham may be specified,—I would place the genus *Eurystomus*‡ of M. Vieillot, which in the essential characters of the bill, and from all we can ascertain of its general habits and economy, seems

* The following extract, from the "*Regne Animal*," contains the greater portion of the information which we possess concerning this species: and I quote it the more willingly, as it shows the affinity which the bird bears to the groups among which I have placed it: "Les *Todiers* sont de petits oiseaux d'Amerique, assez semblables aux *Martin-pêcheurs* pour la forme generale, et qui en ont aussi les pieds et le bec alongé, mais ou ce bec est aplati horizontalement, obtus à son extremité, le tarse plus élevé, et la queue moins courte. Ils *vivent des mouches*, et *nichent a terre*."—*Cuvier, Regne Anim.* i. p. 417.

† The plates referred to are in the second number of that work.

‡ This is the genus *Colaris* of M. Cuvier; but I adopt the name of M. Vieillot in preference to that of the former distinguished writer, inasmuch as the "*Analyse*" of the latter naturalist, in which the genus is characterized and named as above, was published in the year 1816, whereas the "*Regne Animal*" did not appear until the year following.

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seems to bear a striking affinity to the present group. Here also the same considerations would incline me to arrange the *Calyptomena* of Sir Stamford Raffles, which differs chiefly from the groups now mentioned in its comparatively shorter bill, and the singular covering of plumes that project over the upper mandible. All these, and some other corresponding genera will be found, I make no doubt, on more accurate knowledge of their economy, to belong either to the present family, which is placed at the extremity of the *Fissirostres*, or to that of *Pipridæ*, which forms one of the aberrant groups also of the neighbouring circle of *Dentirostres*, and thus comes in contact with the *Todidæ* now before us. More extensive knowledge respecting these birds will determine the line of demarcation between them; but the general affinity by which they approach each other, at least in conterminous families, may at once be decided without hesitation.

If we examine the genus *Todus* of authors with reference to its general affinities, we shall find an intimate resemblance between it and the succeeding group of *Halcyonidæ*; since the only species now known in that genus exhibits the exact representation of a *Kingsfisher*, with the exception of a shorter and more depressed bill. We are thus conducted to the *Halcyon** of Mr. Swainson, and from thence to the *Dacelo* of Dr. Leach;

Since the above observations were read before the Society, I have been strengthened in my opinion, that the place I have assigned this genus is likely to be correct, by some accounts which I have received of the manners of these birds from Mr. Caley, to whose exertions in New Holland the Society is indebted for its valuable Australasian collection. He informs me that "they are birds of passage; that they make a chattering noise somewhat like the *Goatsucker*; and that they feed upon the wing on insects." It may be here added, that these birds, together with *Eurylaimus* and *Todus*, evince an approximation in their general colouring to the singularly brilliant plumage that prevails throughout the *Halcyonidæ*. Nov. 1824.

* *Zoological Illustrations*, Pl. 27. This is an extremely distinct and well-defined genus. It were, however, to be wished, that the name of *Halcyon* had been retained to that group of the family which includes the European *Kingsfisher*, the bird known to the ancients under that name.

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until we find, in the slenderer bill of *Alcedo*, an approaching conformity to the more delicately-shaped bills of the succeeding family of *Meropidæ*. In the present group of *Halcyonidæ* must be placed the genus *Galbula*, Briss., which, though distinguished from the present groups by its zygodactyle feet, and as such arranged by modern writers among the true *Scansores*, was originally included in the genus *Alcedo* by that great master of natural affinities, Linnæus, on account of the identity of the general structure and economy of both groups. Here it must necessarily be placed, if we look to natural affinity, rather than to the strict dictates of artificial arrangement; and with it, I fancy, may be placed some apparently conterminous groups *, of which the toes are equally disposed in pairs. The relationship of all to the true *Scansores* may be accounted for by the consideration of that tendency which opposite sides of a circle of affinity generally evince to approach each other. The very difference, however, between the feet of *Alcedo* and *Galbula*, (which two groups, at the same time it must be remarked, agree more intimately in every particular of the leg and foot, except the scansorial disposition of the toes, than *Galbula* accords with any of the *Scansores* in the same characters,) is lost in a species of *Galbula* which I have lately inspected from Brazil, where one of the hind toes is wanting, and where the foot thus exactly corresponds with that of the three-toed *Halcyonidæ*, or the genus *Ceyx* of M. Lacepede. That sin-

* I allude to the genus *Capito* of M. Vieillot, and some of its affinities. All these exhibit a decided approximation, in general appearance at least, to *Alcedo*, Linn. The kindness of Dr. Horsfield permits me here also to mention two new forms of *scansorial* birds which have lately been added to the collection at the India House from Sumatra. These in the old systems would be referred to *Bucco*, Linn. But the breadth of the base of the bill, which, although more lengthened, resembles that of *Eurystomus*, seems to bring them near to the present groups. If they should eventually be found to come among them, they will most probably unite the *Todidæ* to *Capito* and the other *zygodactyle Halcyonidæ*. In colouring also there is a strong similarity among all these birds. —But such remarks are mere conjecture. The relation in question, which I cannot however pass over without an allusion to it, may perhaps only be one of analogy.

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gular and beautiful species of the Linnean *Alcedo*, the *Ternate Kingsfisher**, shows the equal approximation of that genus to *Galbula*, and a deviation from its own type. Its tail deserts the shortened character of that of the true *Kingsfisher*, and assumes the lengthened and graduated conformation of the same member in the *Paradise Jacamar*, and the other long-tailed *Galbulæ*. We have now arrived at the last family of the tribe, and look for that connecting affinity which will lead us back to that other family of it with which we commenced our observations. Here again the universally acknowledged relationship between the *Halcyonidæ* and the *Meropidæ* leaves me nothing additional to observe. The gradually attenuated bills of *Alcedo* and *Galbula*, and the increasing length of the tail in the latter genus, soften down the differences by which these families, united by general habits and economy, alone appear to be separated. The circular succession

* This beautiful species exhibits so strong a deviation from the *Halcyonidæ* in general, that it requires a separate station in the family: and I take this opportunity of characterizing the group as follows, under the generic title of

TANYSIPTERA.

Rostrum subbreve, subcrassum, rectum, acutum, naribus ovalibus.
Cauda gradata, rectricibus duabus longissimis.

DEA. *T. supernè intensè nigro-azurea, subtus alba; capite tectricibusque cæruleis: rectricibus albis cæruleo-marginatis, duabus mediis cæruleis apice clavato albo.*

Alcedo Dea. *Linn. Syst.* i. p. 181. 13.
Ispida Ternatana. *Briss.* vol. iv. p. 525. t. 40. f. 2.
Martin-Pêcheur de Ternate. *Buff. Pl. Enl.* 116.

The specimens of this species which are brought to Europe are generally deprived of their wings and legs. I am therefore prevented from referring to those members in my generic description. M. Pallas, it must be observed, asserts that the feet of this bird are zygodactyle, and as such he refers it at once to the genus *Galbula*. (*Spic.* Fasc. vi. p. 10. note *b*.) I am indebted to the kindness of Mr. MacLeay, the highly valued Secretary of this Society, for the above description, which I took from a specimen of this rare bird in his valuable collection.

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of affinities by which the tribe of *Fissirostres* returns into itself may thus be considered as complete.

§ 2. DENTIROSTRES.

The depressed bill and insect food of the *Todidæ* introduce us at once to the *Muscicapidæ*, with which they are immediately connected by the genus *Platyrynchus*, Desm. The species that compose the latter group were originally included in the genus *Todus*, and were separated from it only on account of the comparative strength of their legs. The whole of the *Muscicapidæ* indeed, with which family *Platyrynchus* is now united, have a decided affinity to the last tribe, or the birds which feed upon the wing, in their broad-based bills, the *vibrissæ* that surround them, and their similar habits* of darting upon their prey while on the wing. Separated from them chiefly by the strength and more perfect structure of the leg and foot, they form the extreme of the succeeding tribe in which they are numbered in consequence of these distinguishing characters. The line of affinity between the two tribes may thus be assumed as established. The group upon which we now enter, corresponding for the most part with the *Dentirostres* of M. Cuvier, is distinguished by the notch near the extremity of the upper mandible, and its insect food. Besides the *Shrikes* and *Thrushes*, which by the superior strength and power of their bills appear to form the normal groups of the tribe, it contains the remainder of the "*Soft Bil'd Birds*" of Ray, which were not included in the families

* "Ils (les *Gobe-mouches*) se nourrissent uniquement de mouches et d'autres insectes ailés, qu'ils *attrapent au vol.*"—*Temm. Man. d'Orn.* p. 150. "There is one circumstance characteristic of this bird (the *Fly-catcher*) which seems to have escaped observation; and that is, it takes its stand on the top of some stake or post, from whence it springs forth on its prey, catching a fly in the air, and hardly ever touching the ground, but returning still to the same stand for many times together."—*White, Nat. Hist. of Selborne*, p. 28.

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of the preceding tribe. They appear to succeed* each other as follows:

Muscicapidæ.
Laniadæ.
Merulidæ.
Sylviadæ.
Pipridæ.

The family of *Muscicapidæ*, which first meets us as we leave the preceding tribe, contains a multitude of species, diffused over every quarter of the globe, and differing in many important points of generic distinction; but hitherto so ill-defined, and so unsatisfactorily grouped, that any attempt to trace them in detail through their affinities in their present confusion, would be as hopeless as it would be foreign to the general views of this inquiry. They are all, however, well united together by the essential characters which distinguish the type of the group; the notched, depressed, and angular bill, and the strong hairs or *vibrissæ* that surround its base. In these characters, as well as in their manners, they partially correspond with the *Laniadæ*, from the earlier families of which they chiefly differ in their inferior power and robustness.

Entering among the *Laniadæ* by the genus *Tyrannus*, Cuv., which unites them with the preceding *Muscicapidæ*, in which family indeed that genus has generally been classed, and from which I would separate it chiefly on account of the strength of the bill, wherein the character of a *Shrike* is more conspicuous

* In their typical disposition they may thus be grouped:

Normal group. Rostris fortioribus.....	*Laniadæ.*
	Merulidæ.
Aberrant group. Rostris debilioribus....	*Sylviadæ.*
	Pipridæ.
	Muscicapidæ.

than that of a *Flycatcher*, we proceed by means of *Psaris*, Cuv., and *Artamus*, Vieill., to *Dicrurus**, Vieill., the fork-tailed Shrikes of the Old World, where the base of the bill is still depressed and wide, as in the groups we have just quitted, but the *apex* gradually more compressed. Hence we are led by some intervening forms to the still more compressed bills of *Sparactes*, Ill., and the true *Lanius* of authors, which by its short, compressed, and strongly dentated bill, exhibits the type of the family. Here we are met by some conterminous groups, among which *Falcunculus*, Vieill. is conspicuous. And hence we descend by intermediate gradations to the more lengthened and slender-billed *Vanga*, Cuv., together with *Prionops*, *Laniarius*, and *Thamnophilus* of M. Vieillot, which bring us in contact with the *Thrushes*. The extremes of the family will be found in the *Graucalus* and *Ceblepyris* of M. Cuvier, which by their bills, in some degree depressed at the base, lead back to *Tyrannus* and the other broad-billed groups which commence the family. This last-mentioned genus *Ceblepyris* has latterly been arranged with the *Thrushes*. But I feel inclined rather to leave it in its original station among the *Shrikes*, from the peculiarity of its tail-coverts, which form themselves into a kind of puffed-out cluster on the back. This character seems to prevail among the *Laniadæ* more generally and to a greater degree than in other birds: in one species of the family, the *puff-backed Shrike* of Africa, now rendered so familiar to our cabinets from our connexion with the Cape, this singular protuberance is carried to so great an extent as to form an apparently artificial appendage to the back. In the genus before us this peculiarity seems even still further developed in the well-

* This group is perhaps more generally known by the name of *Edolius*, which M. Cuvier has assigned it. I adopt the more ancient term, according to the suggestion of Mr. Swainson in his valuable observations on this family (*Zool. Journ.* vol. i. p. 303.), adhering to the inflexible law of priority. Nov. 1824.

known

known conformation of the same tail-coverts; their shafts being elongated and projected beyond the webs, in stiff and sharpened points. On looking to the general affinity which the extremes of this family bear to the *Muscicapidæ*, and through them to the *Fissirostral* birds of the last preceding tribe, we may perceive the character of feeding on the wing carried on to the *Tyranni*, the fork-tailed *Dicruri*, and more particularly to the *Artami* or the *Piegrièches Hirondelles* of the continental writers; while the depressed bill of the same *Fissirostral* tribe is partially preserved in the groups just mentioned, together with that of *Ceblepyris*, which meets them at the opposite extreme of the circle of affinity. The gradual manner in which Nature deserts any particular structure or mode of economy is in this, as in every other instance, strikingly and beautifully conspicuous.

The family of *Merulidæ*, connected as above with the *Laniadæ*, comprises a considerable number of species, and many natural genera; but which, like most of the *Insessorial* groups, have hitherto received but partial examination. The general views by which they seem to be allied among themselves, as far at least as can be judged from their present unorganized condition, may be stated as follows,—but with that expression of doubt which ever attends inquiries like the present, where the absence of accurate information as to the economy of the subjects before us, and of extensive knowledge of the forms connected with them, leaves us no better foundation for our inferences than partial conjecture. The genus *Myiothera*, Ill. seems to be the first group of the present family which is connected with the *Laniadæ*, where it is met by some of the smaller species of *Thamnophilus**. This group

* I am happy to find these general views confirmed by the accurate examination which Mr. Swainson has made of the *Laniadæ*. The reader may see the line of connexion between *Thamnophilus* and *Myiothera* fully established by the intervention of several forms gradually passing into each other, such as the newly established genera

group seems to lead by *Pitta*, Vieill., and perhaps *Cinclus*, Bechst., through some intervening forms, to the true *Thrushes*, or the genera *Turdus* of authors and *Merula* of Ray, which form the type of the family. To these we may add that portion of the Linnean *Orioles*, which, possessing the curved and notched bill of the *Thrushes*, constitutes the genus *Oriolus** or true *Oriole* of the present day. Here we meet several groups, generally arranged without order in the Linnean genus *Turdus*, and hitherto entirely uncharacterized, which gradually lead from the typical groups to those which possess a more generally delicate conformation; until the comparatively strong form and robust bill of the *Thrushes* is lost in the weaker body and more slender bill of the *Warblers*. Here again the group of *Rock Thrushes*, of which the *T. saxatilis* is the type, appear to bring us round, by their general habits and assimilating characters of bill and *tarsi*, to *Myiothera*, where we entered the family. Those birds which constitute the groups which we denominate *Chatterers*, and which form the genus *Ampelis* of Linnæus, are usually assigned a place near this family: and I must confess that, from the general affinity which they appear to bear to it, I have felt, and still feel, considerable doubt whether this be not their natural station. A strong affinity, however, on the other hand, seems to unite them with the wide-gaped *Pipræ*, and some of those other groups, which by their bill, broad and depressed at the base, appear to come in contact with the earlier divisions of the present tribe, and the extremes of the *Fissirostres* which precede it. The general rule of placing groups in a conterminous situation, according to what appears to be the predominance of their more important

of that gentleman, *Formicivora*, *Urotomus*, and *Drymophila*, in the 1st volume of the "*Zoological Journal*," p. 301. Nov. 1824.

* "GALBULA —— cum *Turdis* et *Merulis* Rostri totiusque corporis figurâ, magnitudine quoque et victûs ratione convenit."—*Raii Syn. Meth. Av.* p. 68.

characters,

characters, has inclined me to arrange the birds of which I speak, provisionally among the *Pipridæ*, at the extreme termination of the tribe before us. In my present view of the case, the characters in which they accord with that family and approximate the extreme groups of the preceding tribe, appear to predominate. More accurate knowledge on these subjects will clear away these and similar difficulties. But I cannot too often insist upon the point, that whatever alterations may take place hereafter in our ideas respecting the disposition of these subordinate groups, they cannot interfere with the general principles which it is the object of this inquiry to illustrate. Instead of impugning our general views, they will merely remove those doubts on minor points in which our present limited acquaintance with nature involves us.

Proceeding to the *Sylviadæ*, the *Warblers* of our British ornithologists, we may observe that the family, assimilated to the groups we have just quitted in the sweetness and compass of their vocal powers, is separated from them chiefly by their more delicate structure and more subulate bill. That portion of the Linnean *Motacilla*, or rather of the *Sylvia* of Dr. Latham, which M. Bechstein has separated from the genus under the title of *Accentor*, in conjunction with that which embraces the *S. luscinia*, the well-known songster of the night, appears to be the group that most nearly approaches the *Thrushes* by the comparative strength of its formation. Here also, perhaps, we may find the *Hylophilus*, Temm. of the New World, and the *Iora*, Horsf. of the East, to be united by their stronger bills. Hence, a number of intervening groups, among which *Brachypteryx*, Horsf. may be noticed, and that which includes the *S. rubecola*, the favourite *Redbreast* of our gardens, may not be passed over, conduct us by their gradually lessening bill and more slender form, to those birds in which the delicate body, the tapering legs, and the gracile and subulate bill, point out their typical supremacy in the family. To these latter

latter groups are nearly allied the *Melizophilus*, Leach., our *Dartford Warbler*, and the *Malurus**, Vieill., the representative of *Sylvia* in Australasia, in both of which the bill deviates from that of the conterminous genera in the *culmen* being somewhat arched; as also those birds which are known to us under the familiar appellation of *Wrens*, or the genera *Troglodytes*†, and *Regulus*, Cuv. To these succeed a number of groups where the lengthened *tarsi* point out their natural station on the ground, such as the *Budytes* of M. Cuvier, the true *Motacilla* of authors, and the *Enicurus* of M. Temminck: here also may be added the *Megalurus*, Horsf., and *Anthus*, Bechst., which unite, as will be observed hereafter, the present tribe with that of the *Conirostres*, by means of the *Alauda* of authors. Close to these birds we find a group

* I speak only of the genus *Malurus* as originally instituted by M. Vieillot (*Analyse d'un Nouv. Orn. Elem.* p. 44.), and which seems to be limited to Australasia. M. Temminck has altered the characters of this genus and so extended them, as to embrace some African species, together with the Eastern Archipelagan group, *Megalurus*, Horsf.; all birds, in my opinion, decidedly dissimilar to the original group pointed out and characterized by M. Vieillot. Mr. Swainson, following the views of M. Temminck, has added a Brazilian species to the genus (*Zool. Illust.* Pl. 138); but very naturally expresses his doubts whether the bounds of the genus have not been too much enlarged, and the group rendered perfectly artificial.

† It is a common opinion among modern naturalists, that the genus *Troglodytes*, of which the type is our common *Wren*, is a true scansorial bird, and should be referred to my family of *Certhiadæ*, which will hereafter be seen to come in among the *Scansores*. From the observations which I have hitherto been enabled to make on the manners of this bird, I cannot at present subscribe to this opinion. That the bird partially climbs in taking its food is evident to every observer; but so do the *Reguli* and *Pari*. The line of distinction between the present limited group of climbers, and the extensive family of true *Certhiadæ*, is marked out in the former using their bill and the latter their tongue in seizing their insect food. If the *Troglodytes* be found to use its tongue for this purpose, it must of course be removed from the *Sylviadæ*; but hitherto I have had no proof of such a fact. Mr. Wilson in his *"American Ornithology"* has described some birds closely assimilated in general appearance to *Troglodytes*, which, from actual observation of their habits and the structure of the tongue, he very properly

a group nearly allied to them in its terrestrial habits and general conformation, the *Saxicola*, Bechst., but which, by its increasing bill, brings us round to the earlier groups of the present family, and thence to the *Merulidæ*, with the section *Saxicoles* of which it is nearly connected*. The circular disposition by which the extremes of different families may be brought into contact with each other, explains the manner in which the genus *Saxicola*, the section of *Merles Saxicoles*, the genus *Myiothera*, and the more delicate forms of *Thamnophilus*,—all birds decidedly approaching each other, yet belonging to the different families of *Sylviadæ*, *Merulidæ*, and *Laniadæ*,—still preserve their union, and are brought together into what may be considered one conterminous assemblage.

properly places in the same genus with the *Certhia familiaris*. But in speaking of two of these birds, *Certhia Caroliniana* and *C. palustris*, he distinctly points out the generic difference between them and *Troglodytes*. "The present species, however, and the preceding, though possessing great family likeness to those above-mentioned (the common Wren of Europe and the Winter Wren of the United States), are decisively *Creepers*, if the bill, the *tongue*, nostrils and claws are to be the criteria by which we are to class them." vol. ii. p. 61. Again, in speaking of the *Winter Wren* of America, which the same accurate observer expresses his "strong suspicion" of being "the same species as the *common domestic Wren* of Britain," he expressly states his opinion, that this species and the *C. palustris* are generically distinct. "They, however, not only breed in different regions, but belong to different genera; the Marsh Wren being decisively a species of *Certhia*, and the Winter Wren a true *Motacilla*." vol. i. p. 40. I wish for no further corroboration of my present views on the subject, than the above observations of that truly accurate naturalist. I have never had an opportunity of examining a specimen of *Certhia Caroliniana*; but in the plate in which it is figured in the "*American Ornithology*" (Pl. xii. fig. 5.) the hind toe appears strong and elongated, after the manner of the true scansorial *Certhiadæ*, while the hind toe of *Troglodytes* is not more developed than in the conterminous *Warblers*. We may observe these two groups to be placed in opposite stations in the general circle of affinity, and may add this instance to many others, where groups similarly circumstanced are found to meet.

* "Ces merles saxicoles, et les traquets (gen. *Saxicola*) qui y tiennent de fort prés, sont placés sur la limite qui separe le grand genre *Turdus* du genre plus nombreux encore de *Sylvia*."—*Temm. Man. d'Orn.* p. 172. ed. 2.

The

The groups to which I have lately alluded, the true *Wrens* of the *Sylviadæ*, display in their general appearance and habits so close a similarity to *Parus*, Linn., the *Titmouse* of our naturalists, that we may at once acknowledge the affinity between the latter family and that of *Pipridæ*, upon which we now enter by means of these *Pari*. And who is there that has not been attracted by the interesting manners of both these familiar visitors of our domestic haunts, and at the same time has not been struck by their resemblance? The *penduline Titmouse*, *P. pendulinus*, Linn., longer and more slender in its bill than the *Pari* in general, seems to be the connecting link between the families. That species is immediately met by the genus *Tyrannulus* of M. Vieillot, which, in the name of "*Roitelet Mesange**," conferred by M. Buffon on the American species of which it is composed, happily illustrates the affinity which I have ventured to point out. It is pleasing to trace in groups which bear a general affinity to each other in their more essential characters, an affinity also in less consequential particulars. This is the case in the present conterminous groups of *Wrens* and *Titmice* with respect to their mode of nidification. The greater portion of both make their nests in holes of trees: but those groups which most nearly approach each other, *Regulus*, *Tyrannulus*, and *Parus pendulinus*, suspend theirs from the branches, leaving the orifice at the centre, and interlacing the materials of which it is composed with corresponding ingenuity and elegance†. The affinity between these birds has been acknowledged by scientific

* The same affinity is pointed out by the following provincial name of this bird. "REGULUS *cristatus* Aldrov.—The GOLDEN-CROWN'D WREN.—In *agro* Cardiganensi *Cambriæ* frequens est, nomine *Britannico* Syvîgw i.e. *Parus chrysocephalus* dicta D. *Lhwyd*." *Raii Syn. Meth. Av.* p. 79.

† The contiguity of this small group to those of *Carduelis*, *Ploceus* and *Xanthornus* in the succeeding tribe of *Conirostres*, seems to point out the cause of the above singular affinity.

as

as well as by common observers; and yet the former have generally ranked the *Pari* in a different tribe, and some indeed have even ranked them in a different order from the *Sylviadæ*, in consequence of their more conical bill and the absence of the mandibulary notch. A rigid deference to those particulars which form the characteristics of the conterminous subdivisions would certainly exclude the *Pari* from the present tribe of *Dentirostres*. But the nature of their food, which consists chiefly of insects, and the similarity of their habits, give them a more natural connexion with the families among which I have now ventured to point out their place, than with the hard-billed and granivorous birds, where they are generally stationed. Here it may also be observed, that they form part of one of the extreme families of the tribe, and are immediately connected with a group of the preceding family of *Sylviadæ*, which passes on to the *Conirostres*, the succeeding subdivision of the order. They thus are brought into contact with the tribe to which the strength and the conical structure of their bill indicates a conformity; while at the same time they maintain their station among the groups where their manners and general economy would naturally place them. The *Pari*, which thus introduce us into the present family, lead us on to the more typical groups of the Linnean *Pipræ*, with which they bear an acknowledged affinity in manners and general appearance*. The genus *Pardalotus*, Vieill., which is the representative of the latter group in Australasia, appears to connect these two allied groups of the Old and the New World, by exhibiting the nearly divided foot of the one and the partially curved bill of the other. Here come in the *Rupicola*, Briss., and *Phibalura*, Vieill. And here, as I have already observed when speaking of the *Thrushes*,

* "Les *Manakins* —— d'autre part leur bec court, et leurs proportions generales, les ont fait long-temps regarder comme assez semblables à nos *Mesanges*." *Cuv. Regne Anim.* i. p. 363.

I apprehend that all those groups will be found to assemble, which, connected with *Ampelis*, Linn., are generally denominated *Berry-Eaters* and *Chatterers*; such as *Bombycilla*, Briss., the true *Ampelis* of authors, *Casmarhinchus*, Temm., and *Procnias*, Ill. To these, the genus *Querula* of M. Vieillot may I think be added. This group, the type of which is the *Muscicapa rubricollis* of Gmelin, is strongly allied by its bill to the foregoing genera, while its habits equally ally it to the family of *Muscicapidæ* which follows. The interval between the present groups and those of the *Pari*, where we entered on the family, appears to be filled up by a race of birds peculiar to New Holland, and hitherto uncharacterized, of which the *Muscicapa pectoralis*, Lath. is the type*. These, uniting many external characters, at least, both of the *Berry-Eaters* and *Flycatchers*, exhibit also in general appearance a considerable resemblance to the *Pari*, and will be found, I conjecture, to be the connecting bond between all these groups. The affinity between this last family of the tribe and the *Muscicapidæ*, which first met our attention as we entered it, has already been observed when I spoke of the separation of the broad-billed *Chatterers* from the *Thrushes*†. And thus equally, as in the former tribe, we may recognize the completion of a circular succession of affinities between all the families of the *Dentirostres*.

§ 3. Conirostres.

The tribe which next meets our attention, comprising most of the "*Conirostres*" of M. Cuvier, and including at the same time the two orders of M. Temminck, which he terms "*Omnivores*" and "*Granivores*," is characterized by the strength and conical form of the beak, and in general by the integrity of its margin.

* Mr. Swainson has lately formed this group into a genus by the name of *Pachycephala*. Nov. 1824.

† See above, p. 438. See also the relationship of these birds to the *Todidæ*, p. 431.

The

The typical groups are for the most part omnivorous; the extremes chiefly granivorous. The latter are those which are comprised by Ray among his "*Hard Bil'd Birds.*" The families of the tribe, among which are included the most powerful birds of the order, and those whose general conformation is the most perfect, may be thus arranged*.

Fringillidæ.
Sturnidæ.
Corvidæ, Leach.
Buceridæ, Leach.
Loxiadæ.

In treating of the preceding tribe, I have observed that the genus *Anthus* has been separated from *Alauda* and placed among the *Sylviadæ*, in consequence of its near affinity to that family, and more particularly to *Motacilla*, in food, in habits, and structure. *Alauda*, on the other hand, with equal attention to the same characters, has been arranged with the succeeding groups which form the tribe of *Conirostres*. These two genera, however, approaching so closely in the form of their wings and of their hind toes, and in the distribution of the colours of their plumage, cannot be allowed to be far separated from each other. The difference even in the bills of the two genera is softened down by the intervention of a Javanese genus, the *Megalurus* of Dr. Horsfield, which unites the greater length of that of *Anthus* to the superior robustness of that of *Alauda*. The affinity between them is even still further preserved by the medium of a

* Or thus, with the normal and aberrant families separated:

Normal group.
Structurâ magis perfectâ: victû universali . . . . . { *Sturnidæ.* *Corvidæ.*

Aberrant group.
Structurâ minus perfectâ: victû præcipue vegetabili . . { *Buceridæ.* *Loxiadæ.* *Fringillidæ.*

 second

second group, which forms a section at present of the genus *Anthus*, and of which the *A. Richardi*, Vieill. may be considered the type, where the bill retains the form of that of *Anthus*, but the hind claw assumes the length and straightness of the claw of *Alauda*. The strong affinity that thus exists between them receives no interruption, in consequence of their forming the extremes of the respective groups to which they belong: and thus, though justly placed in different families, and even in different tribes, they maintain that natural relationship which so intimately connects them. The family of *Fringillidæ*, upon which we now enter, contains, in addition to *Alauda*, to which *Emberiza*, Linn. and its affinities seem nearly allied,—the greater part of the Linnean *Fringillæ*, together with the Linnean *Tanagræ*, which approach them in their external characters, and in their habits, as far as has hitherto been ascertained. These latter groups contain many natural genera, into which the nature of my inquiry, limited to a rapid outline of the affinities that connect the families of the class, will not permit me at present to enter, further than to observe, that they may be traced from the point of their connexion with the Linnean *Fringillæ*, back, by a gradual increase of the base of the bill in breadth and height, to the family of *Loxiadæ*, which unites with them at the opposite extremity of the series of families which compose the tribe. The *Fringillidæ*, again, by means of the sharp-pointed and lengthened bill of *Carduelis*, Briss., and by the extension of the *culmen* of the upper mandible in an angular form for some extent upon the front of the head, conduct us on the other side to the genus *Icterus*, Briss., which commences the succeeding family. Here the genus *Ploceus**, Cuv. also seems to hold an inter-

* There is another decided line of relationship between the two families, namely, that which some species of the Linnean *Alauda*, particularly *A. capensis*, bear to the *Sturnus Ludo-*

intervening station between the two groups, so as to render it difficult to decide in which of them we may assign it its station.

The family of *Sturnidæ* embraces a considerable number of groups, approaching each other in their gregarious and migratory habits. They are found in every part of the globe, united in large flocks, carrying destruction among the cultivated fields, and following herds of cattle for the sake of the insects or grains which they may pick up from their bodies or in their neighbourhood. In addition to the American genus *Icterus*, and the contiguous genera *Cassicus* and *Xanthornus* of M. Brisson, together with *Pendulinus*, Vieill., and several corresponding groups, we may observe the genus *Amblyramphus*, Leach, united to the family, as also the *Buphaga*, Linn., and *Pastor* and *Lamprotornis*, which M. Temminck has separated from the *Thrushes*. The whole of the family, united by their manners and the straight and conical form of the beak, the ridge of which passes back to some extent over the forehead, may be observed by those who cast even a casual glance over the three adjoining groups, to hold an intermediate rank between the weaker conformation of the *Fringillidæ* and the more powerful structure of the *Corvidæ*.

The *Nucifraga*, Briss., our British *Nutcracker*, closely resembling the preceding groups in the form of its bill, in conjunction with *Barita*, Cuv., introduces us into the family of *Corvidæ*. From that genus we may trace a line of affinities, through some intervening forms, to the *Jays* and *Rollers*, *Garrulus*, Briss., and *Coracias*, Linn., until we arrive at the *Corvus* of Linnæus, which again branches out into several groups closely allied to each other, but differing considerably in the structure of the bill.

Ludovicianus, or *Crescent Stare*, of Dr. Latham. This latter bird is well known as the *Alauda magna* of Linnæus, and of the American ornithologists.—*Wils. Am. Orn.* Pl. XIX. fig. 2. But its still stronger affinity to the *Sturni* and *Icteri*, necessarily places it among them. The former relationship appears to me one of analogy, not of affinity; while the direct passage between the families is found in *Ploceus*.

Hence

Hence we proceed by means of *Glaucopis*, Forst., to some genera, among which we may particularize *Ptilonorhynchus*, Kuhl., *Crypsirina*, Vieill., *Eulabes*, Cuv., and *Fregilus*, Cuv., which, in the metallic lustre of their plumage, and the velvet-like process that in some species ornaments the face, indicate our approach to the *Birds of Paradise*. The last-mentioned genus *Fregilus*, in particular, by its curved and slender bill, brings us immediately into this group, the *Paradisea*, Linn., which, in conjunction with the *Epimachus* of M. Cuvier, terminates the family of *Corvidæ*. Here we shall probably find the passage from the present to the succeeding family. The *Epimachus**, more united in its front toes than the *Corvidæ* in general, holds a middle station in respect to that character between the two groups; while in the length

* I speak with considerable hesitation as to the situation of *Epimachus*; which bears too strong a resemblance to the *Promerops* of M. Brisson, a group feeding on vegetable juices with an extensile tongue (see *Cuv. Regne Anim.* i. 407.), to permit us to separate it without some expression of doubt. On the other hand, it bears evident marks of affinity to *Paradisea*, near which genus I have placed it for the present. Its manner of feeding, and the nature of its food, when accurately known, will alone determine this point. I have some suspicion also whether some groups of *Paradisea* may not naturally have a different locality from that of the present family. The accounts which have reached us of the economy of those birds, have hitherto been vague and unsatisfactory, and bear evidently the marks of being fabulous. But popular fables have usually some foundation in truth. And the pretended apodous construction of the *Paradiseæ*, together with the poetical fancies of their being always found on the wing, and feeding on the dews of heaven, may be resolvable into the simple fact of their using their wings more than their legs when extracting the nectar of flowers. The strength, however, of their bills and legs in general is much against this supposition. There is, or lately has been, a specimen of the *P. apoda*, Linn., alive in this country, an account of the economy of which would be highly interesting and important. Any partial changes, however, among the subordinate groups which are brought together in the present attempt at a natural arrangement, cannot affect the general views, which alone I regard as of consequence. I cannot too often insist upon the point, that it is the great outline of affinity throughout the whole class of birds, which I endeavour to trace out in the sketch before us, and not the immediate relationship between the minor departments.

and

and curvature of its bill, it approaches, in conjunction with many of the *Paradiseæ*, to some of the extreme species of the *Buceridæ*, among which the *Buceros nasutus* of Dr. Latham may be instanced.

We thus arrive at the singular family of *Buceridæ*, which seems to draw near to the preceding groups in its food and habits*, as far at least as we can conclude from the very imperfect accounts which are transmitted of them. From the strength also of the formation of these birds, and the powers with which they are endowed, they seem to assert a title to a place in the vicinity of the group which is typical in the tribe. In one particular, however, we may detect a deviation from the more perfect structure of that type. The fore toes of all are strongly united at the base, the external being joined to the middle as far as to the second articulation; an impediment which must considerably interfere with the free action of the member. This deficiency is, on the other hand, retrieved by the superior robustness and muscular conformation of the whole limb. An analogous defect, and an analogous mode of compensating for it, is observable in the *Ostrich*, a bird also, it is to be observed, closely allied to the typical group of its own family; and in both instances we may pronounce the deviation from the more regular or perfect conformation to be a defect rather to the eye of the observer, an infringement upon what he would conceive to form the *beau ideal* of the typical character, than a defect in reality. We may here delay a moment to observe upon the causes that assign so totally remote a station from the present to the *Todidæ*, *Meropidæ*, and *Halcyonidæ*, whose gressorial feet, as they are technically called, are of precisely the same structure as those of *Buceros*. In them

* Grands oiseaux d'Afrique et des Indes, —— leur port et leurs habitudes les rapprochent des corbeaux.—— Ils prennent toute sorte de nourriture, chassent aux souris, aux petits oiseaux, aux reptiles, et ne dedaignent pas même les cadavres.—*Cuvier, Regne Anim.* i. p. 418.

the

the deficiency, accompanied by a corresponding weakness of the whole member, is real, and of sufficient consequence to deprive the bird of the means of using its legs and feet to advantage. The force and powers of these parts are in fact transferred to the wings, which are thus endowed with a more than usual share of strength, in order to afford the bird a more than usual assistance in the aërial mode of seeking its food which it is assigned by Nature. In the *Buceros*, on the other hand, the gressorial feet are accompanied by a superior robustness, which counterbalances their inferiority in form. And hence the family may consistently maintain its station in the vicinity of the more perfectly formed and typical groups of the *Insessores*, which are now before us. The tendency, already observed, which opposite points of the circle in which a series of affinities is united have to approach each other, accounts for the resemblance here pointed out between these otherwise discordant groups, and serves to explain the reason why the analogous relation between them has been mistaken for a relation of affinity by systematic writers, so far as to induce them to arrange all the gressorial birds in one connected group. Besides the genus *Buceros*, Linn., the protuberance on the bill of which varies in almost every possible shape in which fancy can embody it, the present family includes the *Momotus* of M. Brisson, which accords with the entire of that genus in its gressorial feet, and with several species of it, as the genus now stands, in its curved but somewhat shorter and more attenuated bill.

The family of *Loxiadæ*, the extreme of the tribe of *Conirostres*, exhibits a conformity to the groups we have just quitted, in the strength and grossness of their bill. Inferior to them chiefly in size, some species of the family may be observed to equal even the *Hornbills*, allowance being made for their relative proportions, in the extreme enlargement of this member. The curved and serrated bill of the latter family, perceptibly shortening

ing itself, as we have perceived in *Momotus*, is still carried on to a corresponding group in the present, the *Phytotoma*, Gmel., where these characters are preserved, though the curve is slighter and the serration less strong. United to that genus by some intermediate but uncharacterized species, the *Coccothraustes*, Briss., conducts us on to several groups, among which *Pitylus*, Cuv., *Strobilophaga*, Vieill., the true *Loxia* of authors, and *Psittirostra*, Temm., may be distinguished; from whence we pass to the shorter-billed groups, among which *Colius*, Linn., and *Cissopis*, Vieill., may be particularized. These are but few of the natural genera which abound in this extensive family. Many intervening species, possessing strong generic distinctions, may be introduced among these groups, which at length terminate in some of the shorter and stronger-billed species of the Linnean *Tanagers*. These, it will be remembered, commenced the present tribe by their union with the *Fringillidæ*: and thus here also the circular succession of affinities extends uninterrupted through the whole subdivision.

§ 4. Scansores.

The deviation which has been observed in the *Buceridæ* from the more perfect formation of the foot, prepares us for the still more considerable deviation that takes place in the same particular among the *Scansorial Birds;* and we consequently expect to find the passage from the *Conirostres* to the *Scansores* in that family, which thus opens the way between them. In this expectation we are not disappointed. Besides the approach which we have just noticed in the *Buceridæ* to the imperfect form of the scansorial foot, we may perceive that the large and disproportionate bill of that family is carried on* to the *Ramphastidæ*, the first

* "Les Calaos, (*Buceros*, L.) —— Grands oiseaux —— que leur enorme bec dentelé surmonté de proéminences quelquefois aussi grandes que lui, ou au moins fortement renflé

first family of the *Scansores* which meets our attention. There is seldom, perhaps, a surer guide to relations of affinity and analogy than common observation; and a trivial or provincial name often anticipates the more correct and scientific views of the naturalist. In seeking for the immediate point of junction between the two tribes now before us, we are in this manner directed at once to the object of our search; a scansorial genus, belonging to the family of *Ramphastidæ*, the *Scythrops* of Dr. Latham, being designated, as may be seen in the Collection belonging to this Society, by the denomination of "*Psittaceous Hornbill.*" Whoever will compare this bird with some of the extreme species of the *Buceros*, those I mean without the protuberance on the bill, will readily acknowledge the appropriateness of the title, and recognise the affinity which leads us from the preceding to the present tribe. The scansorial families may thus be grouped*:

renflé en dessus, rend si remarquables et lie avec les Toucans."—*Cuvier, Regne Anim.* i. p. 418. The general accounts which we have of the manners of these birds tend equally to assimilate them. Mr. Swainson informs me, from observations made during his researches in South America, that he has every reason to suppose that the *Ramphastidæ* are accustomed to feed during the season of incubation upon the eggs and young of other birds. I have here to add, that a specimen of the *R. erythrorhynchos*, Gmel., now alive in this country, shows an evident partiality to animal food, and a disposition to prey upon weaker birds. I am informed that, shortly after its arrival in this country, it seized upon a small-bird that accidentally came within its reach, and devoured it in a truly raptorial manner. It has since been occasionally fed with small-birds, and with eggs, which seem to be its favourite food. These manners accord with those of *Buceros*, as detailed in M. Cuvier's valuable observations. See note *, p. 449. Nov. 1824.

* Or in this manner, if we distinguish the typical families:

Normal group.

Digitis zygodactylis, haud retractilibus . . . . . { *Psittacidæ.* / *Picidæ.*

Aberrant group.

Digitis aut tribus anticis et uno postico scansorio, aut zygodactylis, at retractilibus . . . { *Certhiadæ.* / *Cuculidæ.* / *Ramphastidæ.*

Ramphastidæ

Ramphastidæ.
Psittacidæ, Leach.
Picidæ, Leach.
Certhiadæ.
Cuculidæ, Leach.

Commencing our examination of the present tribe with the family of *Ramphastidæ*, we may observe that it is composed of the genera *Ramphastos*, Linn., and *Pteroglossus*, Ill., which fill up the same station in the New World that *Buceros*, the group which we have just quitted, maintains in the Old. To these genera we have already seen that *Scythrops* may be added, which appears equally assimilated to both groups, and thus to supply their place in that new division of the globe, the continent of Australasia. This genus, it may be observed, unites the present family with the larger and more prominent billed *Cuculidæ*, which meet it at the other extremity of the tribe: and here in this direction, the succession of affinities appears established. The immediate connexion, however, of *Ramphastos* with the succeeding group of *Psittacidæ* is not so evident. These families are placed next to each other by all systematic writers; and I decidedly concur in the general views which bring them into neighbouring groups. But at present I am acquainted with no forms which intimately connect them, and soften down the important difference observable in the bills and tongues of these birds. This is one of the greatest chasms which interfere with the continuity of our chain of affinities. I might indeed hazard some suggestions* as to the mode in which this difficulty may

* I might particularly mention the *Trogon*, Linn., as a bird, whose bill, serrated, but at the same time short and hooked, seems to give it a similitude to each of these groups. We know but little of this genus, although it abounds both in the Old and New World, and that little is altogether insufficient to afford us any information as to its actual affinities.

be solved; but I wish chiefly to illustrate the general principles of this inquiry by such facts as are acknowledged, and such inferences as are indisputable, without treading on the unstable ground of conjecture. The candid exposition of the present and similar *desiderata* will only tend, I hope, to draw the attention of those who are interested in such subjects more closely to these points, with the view of supplying our deficiencies by more accurate research.

It is not, however, to the *Ramphastidæ* that we have to attribute this present apparent interruption in our series, so much as to the *Psittacidæ*, upon which we now enter. This family affords more difficulties to the inquirer into affinities than any other known group in the whole class. In manners and general structure, as well as in the mode of using their feet and bill, the *Parrots* hold nearly an insulated situation among birds; and they may perhaps be pronounced to be the only group among them which is completely *sui generis*. In the formation of my opinion, that their station in nature accords with the place assigned them in the foregoing series, and that they come next to the *Picidæ* in affinity, I at first felt some doubt, in consequence of the difference in their bills and tongues, here equally apparent as in the case immediately preceding. But I was decided in my opinion by observing, that while there was no other group with which they accord more closely in such characters, they possess an affinity to no birds but the *Picidæ*, in the structure of the foot and the use to which they apply it. It is to be remembered, that the leading characteristic of the tribe before us is the faculty of climbing; and the greater portion of the families contained in it possess what are technically called *zygodactyle* feet, or feet in which the toes are disposed in pairs, and which are generally considered as conducive to that faculty. But the *Picidæ* and the *Psittacidæ* are the only families, thus distinguished, whose toes

are

are strictly and constantly disposed in pairs: and they are consequently the only groups which constantly benefit by that construction in climbing. The external hind toe of the other *Scansores* is retractile: and these birds are never observed to climb, at least to that extent which is common to the two families in question. We may thus venture, I think, to separate the *Parrots* and *Woodpeckers* from the other families, and to associate them together, in consequence of their affinity in these essential characteristics of the tribe. In this point of view they will compose its normal groups, as climbers *par excellence*, differing, however, as to the mode in which they climb; the *Parrots* using the foot chiefly in grasping the object which assists them in their ascent, and in conjunction with the bill; while the *Picidæ* rely upon the strength and straightness of the hind toes in supporting them in a perpendicular position on the sides of trees; in which posture they are also assisted by the strong shafts of the tail-feathers. While I was influenced by these general points of coincidence, in placing the *Psittacidæ* and *Picidæ* together*, I recognised a group which appeared to intervene between them, and to diminish the apparent distance that exists even in the form of their bill. That important group, which comprises the Linnean *Barbets*, evidently exhibited the expected gradation in the structure of that member; the bill of *Pogonias*, Ill. approaching most nearly that of the *Parrots*, by its short, strong, and hooked conformation†,

* There are some minuter and less essential points also in which this approximation is evident. Some of the *Psittacidæ*, among which I shall particularize the *Psittacus Alexandri*, Linn., and its congeners, partially employ the tail in supporting themselves as they climb, in a corresponding manner with the *Woodpeckers*. I make this remark from my own observation. The tongue also peculiar to the family may be observed to become slenderer, and, as is said, more extensible, in that group of which *P. aterrimus*, Gmel. is the representative; thus evincing an approximation, slight indeed, but still an approximation, to the bill of the *Woodpeckers*.

† It also comes nearer to them by its frugivorous habits. "Ils (Sc. les *Barbicans*) mangent plus de fruits que les autres espèces."—*Cuv. Regne Anim.* i. p. 428.

while

while the straighter and more lengthened bill of the true *Bucco* united itself to that of *Picus*. Many other particulars in form, and also an extraordinary conformity in colouring, still further pointed out the affinity; and I was at length confirmed in my conjectures respecting the situation of these birds, by arriving at the knowledge of their habits being actually those of the true *Woodpeckers**, and of their chief affinity being to that group. The regular gradation by which these two families, united in their general characters—and those the characters, it must be remembered, most prominent and typical in their own tribe—are also united in their minuter points of formation, appears to me now eminently conspicuous.

We are thus introduced to the family of *Picidæ*, a very important and well-defined group both in manners and general conformation. It is composed, as we have seen, of the genus *Pogonias*, Ill., in some species of which the serrated bill is gradually lost, or rather changes into the entire bill of some of the shorter-billed species of the true *Bucco*, Auct., which succeed them. The bills of these again lengthen by degrees, and nearly assume the form of those of the Linnean *Picus*, which composes the

* "The only birds were a little noisy *Barbet* (*Pogonias*, Ill.—*Bucco niger*, Gmel.), which the Hottentots called *Hout Kapper* (*Woodcutter*), from the noise it makes with the beak against the branches of trees, in search of insects."—*Burchell, Travels in Africa*, vol. i. p. 318. My attention was first called to the above peculiarity in the manners of the *Barbets* by Mr. Swainson, to whose friendship I am indebted for much valuable information in my inquiries into affinities: and on applying to my friend Mr. Burchell for further information, I received still more corroborating proofs of the intervention of these birds between the *Parrots* and *Woodpeckers*. That gentleman also entered into a detailed account of these affinities, before a meeting of the Zoological Club of the Linnean Society, extracted from his personal observations during his Travels. But I refrain from entering further into the subject than the foregoing extract from his published narrative, lest I should in any way anticipate the very interesting observations which the scientific world are anxiously looking for, on the Natural History of Southern Africa. Nov. 1824.

greater

greater portion of the present family. A group of these, represented by the *Picus minutus*, Linn., in which the shafts of the tail-feathers are soft and flexible, unlike those of the genuine *Woodpeckers*, leads round again to the *Barbets*, where the family commences. To these also the well-known genus *Yunx*, Linn., appears to be associated. The strong affinity between this family and the succeeding group of *Certhiadæ*, in their general habits of climbing, and of feeding by their extensile tongue, needs no illustration. In less important points they equally pass into each other. The difference in the form of the typical bill of *Picus*, and that of the true *Certhiæ*,—the one straight and powerful, the other curved and slender,—is softened down by the intervention of the genus *Dendrocolaptes*, Herm.; which, as it stands at present, includes some groups* where the bill is as strong and as straight as in *Picus;* others† where the bill, still retaining its strength, becomes gradually curved; and others‡, where the same member, still further deviating from the type of the genus to which it belongs, assumes the full curve and slenderness of the bill of the typical *Certhiæ*. The former group, or the Linnean *Pici*, it may be again observed, includes some species where the bill loses the straight and angulated form, and becomes curved and compressed. These birds, of which the *Picus auratus* of Linnæus is the representative§, exhibit in this particular an evident approximation to the true *Creepers;* while these latter birds, on the other hand, evince an equal contiguity to the former, in some of the aberrant groups of the family, which retain the stiff shafts of the tail-feathers, so conspicuous in the true *Pici*. The gradual manner in which the two groups pass into each

* *Dendrocolaptes Picus*. Pl. Enl. 605.

† *D. scandens*. Pl. Enl. 621.

‡ *D. procurvus*. Temm. Pl. Col. 28.

§ This group forms the genus *Colaptes* of Mr. Swainson.

other

other would leave us in some doubt as to where the line of demarcation may be drawn between them, did not the conformation of the foot of the *Certhiadæ* evidently evince a deviation from the perfect structure of the more typical *Scansores*, and thus distinguishing them as an aberrant group of the tribe, make it necessary that they should be placed in a separate family.

The different structure of the foot from that of *Picus* thus brings us among the *Certhiadæ*. Here that member is not strictly scansorial. But a similar assistance to what is conferred on the *Picidæ* in climbing, by the two toes being placed behind, is afforded the *Certhiadæ* by the single hind toe being considerably longer and more robust than is usual among the *Perchers*. The affinity that brings these birds together in a natural group is thus preserved, not by an identical, but by a similar and equally effective mode of conformation. I feel some diffidence, I must confess, in infringing upon the usual and more regular rules of systematic arrangement, by placing this family among the birds with true scansorial feet: but I am influenced by a consideration paramount to that of uniformity of system; by observing, in fact, that the whole group of climbing birds before us is united by strong natural affinities. And when I perceive a series of natural objects thus united, I draw the conclusion that it is the group which affords the character, and not the character which constitutes the group.—"Scias," says the great master of natural science, "characterem non constituere genus, sed genus characterem:—characterem non fluere e genere, sed genus e charactere:—characterem non esse ut genus fiat, sed ut genus noscatur*."—In a group strongly and naturally united as that before us, the evanescence in any of its subordinate subdivisions of any particular character common to the rest, does not prove that the subdivision in which such a character disappears is incon-

* *Linn. Phil. Bot.* p. 119.

gruous

gruous with the group in general, but merely that it is placed at the extremity of it, and forms the passage to another. This is the case with the *Certhiadæ*, which become an aberrant group in the tribe, inasmuch as they deviate from the more perfect formation of the typical *Scansores*, and at the same time, as will be presently observed, lead the way immediately to the succeeding tribe of *Tenuirostres* by having in common with them the habit of feeding by the tongue. In addition to *Dendrocolaptes*, already mentioned, and the true *Certhia* of the present day, the family before us consists of a variety of genera strongly united by their corresponding habits. Among these, *Climacteris*, Temm., and *Orthonyx*, Temm., preserve the strong shafts of the tail-feathers which are carried on to them from the true *Pici*. This construction gradually disappears in the remaining groups of the family; but the strong hind toe and the tongue more or less extensile, and serving to spear their prey, is still conspicuous. Among such groups we may particularize the *Tichodroma*, Ill., and *Upupa**, Linn., together with the Linnean *Sitta* and the conterminous form of *Xenops*, Ill. Here also may be associated the *Opetiorhynchus* and *Anabates* of M. Temminck, as also the *Oxyrhynchus* of the same author. This genus may be observed to be connected with those groups of the present family which are united with the genus *Yunx* of the preceding; it is a perfect *Wryneck*, as justly asserted by M. Temminck†, with a *Creeper's* foot. I wish not at present, however, to enter into the affinities of these groups. We know but little of them as yet: and every day is bringing in fresh subjects, and fresh information on a department of the class which has hitherto, I know not why, attracted but little attention.

Neither do I wish to dwell with any particularity on the suc-

* "Ce que le *Grimpereau* et le *Tichodrome* font sur les arbres, et le long des murailles, la *Huppe* le fait a terre."—*Temm. Man. d'Orn.* p. 414.

† *Man. d'Orn.* p. lxxx.

ceeding family of *Cuculidæ*, the various and extensive genera of which are as yet but little understood, as far as regards their natural affinities. The Linnean genus *Cuculus*, indeed, as at present constituted, forms an extremely artificial group. There is much to be done with respect to these birds, and they would form an interesting subject for the researches of an ornithologist who might have leisure and opportunity to describe their living manners and economy. I shall only now observe with respect to external character, that some genera of the family are associated with the true *Cuculus* by their curved and slender bill; others, like *Indicator*, Vieill., have a shorter and stronger bill; while *Saurothera*, Vieill., by its serrated bill evinces an approaching conformity to the *Ramphastidæ*; and a considerable number, such as *Centropus*, Ill., *Phænicophaus*, Vieill., and *Crotophaga*, Linn., indicate the same affinity by the gradual increase of the bill in length and size. The last-mentioned genus, it may also be added, bears a relation, through the medium of *Scythrops*, to the *Hornbills;* some species of that family, and one more particularly lately discovered* in the interior of Africa, possessing,

* The bird I allude to is in the possession of Mr. Leadbeater, of Brewer-street, who has kindly allowed me to give the following description of the species:

BUCEROS, *Linn.*

LEADBEATERI. *B. niger, remigibus primoribus albis; regione ophthalmicâ gutturequenudis coccineis, cæruleo-variegatis; rostri dorso elevato, cultrato, compresso.*

Rostrum nigrum, dorso carinato, *Crotophagæ* rostro persimile. *Capitis* vertex, *remiges* secundariæ quinque internæ, *rectrices*que intensè nigræ. *Dorsum, collum, pectus, abdomen, remiges*que secundariæ, quinque internis exceptis, fusco-nigræ: *remiges* primariæ albæ, maculis parvis nigris confertis ad medium pogonii externi conspersæ. Long. *corporis*, 3 ped. 7½ unc.: *rostri*, ad frontem, 7¾ unc., ad rictum, 8; altitudo, 2¾. Long. *tarsi*, 6½: *digiti* medii ungue incluso, 3½: *hallucis* ungue incluso, 2½: *unguis* medii, ¾.

Habitat in Africâ interiori Septentrionali.

In Mus. Dom. Leadbeateri.

OBS. Hæc species, *B. Abyssinico* in cæteris valde affinis, rostri structurâ omnino differt.

though

though with gigantic dimensions, the exact bill of the *Ani*. The series of affinity, in which the *Scansores* are united, thus returns into itself.

§ 5. Tenuirostres.

The genus *Certhia*, as originally instituted by Linnæus, contained, besides the true *Certhia* and its congeners, which form the extreme family of the preceding tribe, all those birds whose slender and gradually curved bills, and delicate formation of body, added to their practice of employing their tongues in taking their food, indicated a strong affinity to each other, and which have since been particularized by authors under the various names of *Nectarinia*, *Cinnyris*, *Drepanis*, &c. To the group thus known and described by the Swedish naturalist, later ornithologists, who have strictly followed his steps, have added another, discovered since his time in Australasia, similar in habits and manners, and now distinguished by the generic title of *Meliphaga*. The whole of the birds, however, thus united by close affinities, and as such generally brought together by systematic writers into one conterminous series, are decidedly divisible into two distinct groups, naturally arranging themselves under different subdivisions of the order. The family of *Certhiadæ*, as we have seen above, live upon animal food; while the remaining genera of the Linnean *Certhia* subsist chiefly upon vegetable juices. The tongues of each, though similar in being more or less extensible, and in being the medium through which they are supplied with food, are equally distinct as the nature of the food itself. Those of the former are sharp, and of a spear-like form, as if to transfix the insects which are their prey; while those of the latter are divided into tubular filaments, which appear exclusively adapted to the purposes of suction. In other particulars they exhibit an equal difference. The *Certhiadæ* climb, and their feet are of a conformable structure: but the feet

of the *Suctorial Birds* are not only in general unsuited to that purpose, but they become gradually weaker and of less use, as they come nearer the type of the tribe, where they are so short and slightly formed, as to be serviceable only in perching, when the bird is at rest. It is one of the greatest beauties of the natural system which it is my object in these inquiries to illustrate, that it reconciles decided differences with decided affinities, and renders the otherwise discordant views of systematic writers compatible with each other. It is thus that the two groups of the Linnean *Certhia* are disposed in the separate departments to which the distinct nature of their food and habits more immediately unites them; while at the same time, by their forming the extremes of their respective tribes, and touching each other at the corresponding points of the circles in which they are arranged, their obvious affinities are preserved inviolate.

We thus find ourselves among the *Tenuirostres*, or *Suctorial Birds*, the most interesting group perhaps of the animal world. Deriving their subsistence for the most part from the nectar of flowers, we never fail to associate them in idea with that more beautiful and perfect part of the vegetable creation, with which, in their delicacy and fragility of form, their variety and brilliancy of hues, not less than by their extracting their nourishment from vegetable juices, they appear to have so many relations. As the tribe is confined exclusively to the torrid zone and the southern hemisphere, the naturalists of our northern latitudes have little opportunity of observing their manners or of inspecting their internal construction. Much confusion has consequently arisen in assigning them their respective stations, more particularly among the *Honeysuckers* of New Holland, which have been indiscriminately scattered among every group of the order. In the absence of that certain and perfect information which alone can authorise us to decide upon the station of any bird

bird in nature, I cannot at present undertake to fill up the details of this tribe, with much pretension to accuracy. The following sketch however of the suctorial families will, I imagine, be found to afford some approach, in its general outline, to the natural divisions into which the tribe branches out, and to the order in which they succeed each other*.

Nectariniadæ ?
Cinnyridæ.
Trochilidæ.
Promeropidæ ?
Meliphagidæ ?

M. Illiger was the first who separated the true *Certhia* of the present day from the groups of the Linnean *Certhia*, which feed upon vegetable juices, and which he therefore distinguished by the generic title of *Nectarinia*. This latter genus, comprising two distinct and strongly marked groups, has again been separated by M. Cuvier into two divisions; to the first of which, consisting of birds whose bills are shorter and stronger than those of the second, and whose feet are also in general more robust, he has retained the name of *Nectarinia*, while he has distinguished the latter division, where the bills are longer and more attenuated, and the legs and feet are proportionally more delicate, by the appellation of *Cinnyris*. The two first families in the above arrangement

* Arranged according to their typical characters, they thus succeed each other:

Normal group. Rostris pedibusque gracilioribus	*Cinnyridæ.* *Trochilidæ.*
Aberrant group. Rostris pedibusque fortioribus	*Promeropidæ ?* *Meliphagidæ ?* *Nectariniadæ ?*

accord

accord with these views of the distinguished French naturalist. Besides the difference in their structure, the two groups may be separated by their geographical limits. The *Nectariniadæ*, as far as I can trace out their extent, are confined to the New World; while the *Cinnyridæ* are circumscribed within the bounds of the ancient continent and its adjoining islands. In looking to the succession of affinities in the tribe, we may remark that the *Nectariniadæ* appear to hold, by the comparative strength of their feet and bill, an intermediate rank between the *Creepers* of the last tribe and the typical groups of the present. In the use they make of their feet, this is particularly observable. The *Certhiadæ*, as we have seen, employ their feet in climbing: the *Nectariniadæ* do not climb, but hop from flower to flower*, exploring the nectary of each; while the *Cinnyridæ* and *Trochilidæ* make no use whatever of the foot as they extract their food, but during this process are poised entirely on the wing. The two last-mentioned families again approach each other in the slenderness of their bill, the vividness and changeable lustre of their plumage, and the habit of hovering on the wing while they feed. They are chiefly separated by the comparatively stronger foot and bill of the *Cinnyridæ*. A line of demarcation also points out the geographical distribution of these two families, the *Trochilidæ* being exclusively confined to America, and the *Cinnyridæ*, as I have already stated, to the Old World. These two typical families are the only groups in the tribe of whose situation I can speak with any

* The following are the observations of a scientific eye-witness of the manners of a species of the *Nectariniadæ*, the *Nectarinia cyanocephala*. "Its habits are no less perfectly the same as the rest of the *Nectariniæ*. It frequents the same trees as the Humming-birds, hopping from flower to flower, and extracting the nectar from each; but this is not done on the wing, because its formation is obviously different from the Humming-birds, which, on the contrary, poise themselves in the air during feeding." *Swainson, Zoological Illustrations*, Pl. 117.

con-

confidence*. The aberrant families are so numerous in their forms, and hitherto have been so unsatisfactorily characterized,

* During the time that has elapsed since the reading of the above observations on the *Tenuirostres*, I was in hopes of having it in my power to trace their affinities more perfectly through their various subordinate groups before my remarks went to press. My friend Mr. Swainson, having lately paid considerable attention to this tribe, kindly promised me the result of his labours to enable me to apply them to the general object of this inquiry. But various delays and circumstances, over which neither he nor I had any controul, have prevented our mutual wishes taking effect; and the above imperfect sketch must go forth as it originally stood. I have introduced, however, the genus *Promerops* as the connecting group between the *Tenuirostres* and *Fissirostres*, according to a suggestion which that gentleman some time since made to me in a conversation respecting these groups. I had originally conjectured that the genus *Dicæum* of M. Cuvier and of Dr. Horsfield (*Linnean Transactions*, vol. xiii. p. 169.) would constitute this aberrant subdivision. The "Zoology of Mexico," now about to appear, may be referred to as explaining the immediate affinities of these truly interesting families. Nov. 1824.

Since the above observations were sent to press, I perceive that Mr. Swainson has published his views on the general disposition of the *Tenuirostres* in the 1st volume of the *Zoological Journal*, p. 479. He introduces the Linnean genus *Paradisea* as one of the five groups of the tribe, and as supplying the interval between the families of *Meliphagidæ* and *Promeropidæ*. I have already stated my suspicions (p. 448, note *) that the *Birds of Paradise*, or at least some groups of them, may eventually be found to be more nearly allied to the *Mellivorous Birds* with extensile and tubular tongues, than to the family of *Corvidæ*, with which ornithologists in general conceive them to be connected. And my opinions on this point have been considerably strengthened by finding that Mr. Swainson has adopted a mode of distribution conformable to such a supposition. But the nature of an inquiry like the present, limited to a simple exposition of facts, as far as they can be ascertained, and to such inferences only as are deducible from these facts, originally forbade me to offer more than a mere suggestion on this point, and still prevents me from expressing myself with any confidence respecting it. The question, in short, is one exclusively of fact. The Linnean *Paradiseæ* confessedly exhibit in external appearance a strong relationship to both the *Conirostral* and *Tenuirostral* families. But to which of the two groups they are related by affinity, and to which by analogy, depends entirely on the nature of their food and the structure of their tongue. I must confess that I feel considerable interest in this question, and sanguine hopes that Mr. Swainson's distribution may be found to accord with that of Nature. The junction of the *Paradiseæ* to the *Tenuirostres* would add all that is wanting to complete the interest of that already singularly attractive group. Jan. 1825.

that

that it is impossible to speak of them with that certainty which may attend our observations on groups that are better defined. The genus *Promerops*, Briss., appears to be that form of the present tribe which approaches nearest to the adjoining tribe of *Fissirostres*. Retaining the slender bill of the *Tenuirostres*, it exhibits somewhat of the broad base of the bill of the *Fissirostres*, and at the same time their gressorial feet. By means of *Merops*, the curved bill of which approaches the structure of its own, it appears to be immediately connected with that group. Of the limits of this family, which may receive its appellation from M. Brisson's above-mentioned genus, I can say nothing at present; nor do I wish to enter into more than a general reference to the succeeding family of *Meliphagidæ*. That extraordinary group, the existence of the much more considerable portion of which was unknown to the Swedish naturalist, and for which there was consequently no place in his system, occupies a prominent and important situation in the ornithological department of Nature. Chiefly confined to Australasia, where they abound in every variety of form, and in an apparently inexhaustible multitude of species, they find a sufficient and never-failing support in the luxuriant vegetation of that country. There the fields are never without blossom, and some different species of plants, particularly the species of *Eucalyptus*, afford a constant succession of that food which is suited to the tubular and brush-like structure of the tongue in these birds. Their numbers and variety seem in consequence to be almost unlimited. Like the *Marsupial Animals* of the same country, a group to all appearance equally anomalous, which contains within its own circle representatives of all the other groups of the *Mammalia*, this division of birds comprises every form which is observable among the families of the *Insessores*. From the powerfully constructed and strong-billed *Corvidæ* and *Orioli*, down to the slender *Merops* and the delicately shaped *Cinnyris*, every *Insessorial* group has its

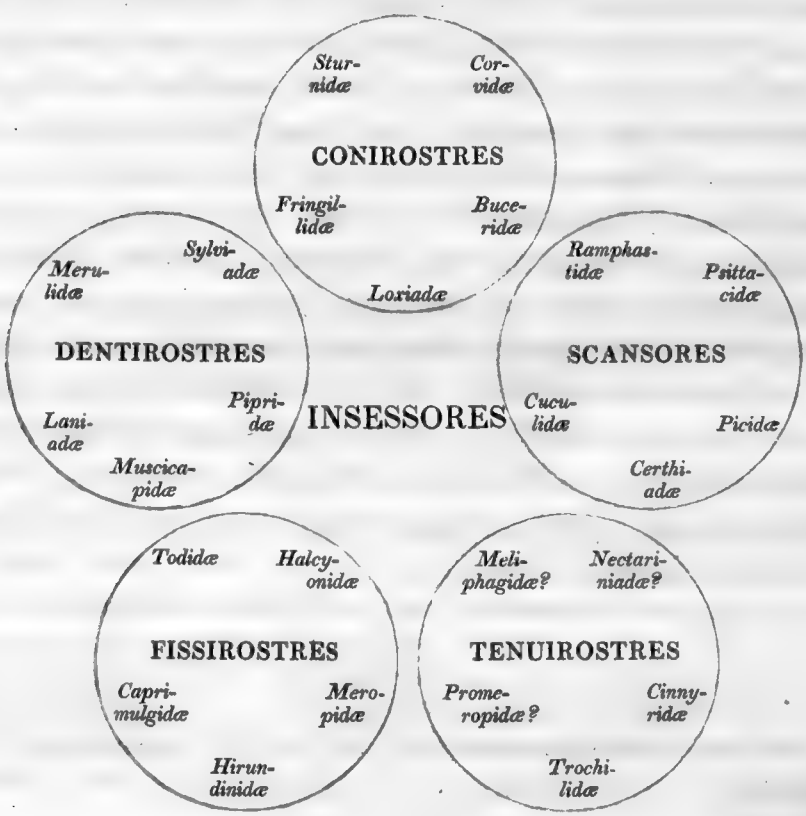
its analogous type in this family. Their approach to the *Scansorial* tribe is strongly conspicuous. The hind toe of the greater portion of the group is long, powerful, and apparently formed for climbing*. In this point of view they seem in Australasia to supply the place of the genuine *Pici*; no species of *Woodpecker*, as far as I have been able to ascertain, having hitherto been found in that country. This strong affinity to the *Scansores* is preserved by their forming one of the extremes of the present circle, which comes in contact with that tribe. I have indeed some doubts whether, in consequence of this affinity, they may not be even still more intimately united to that group, and form the immediate point of junction of the present tribe with the *Certhiadæ*. I have consequently entered them and their conterminous families into the above tabular series with a mark of uncertainty. Time, with more accurate examination of their manners and internal economy, will clear away, it is to be hoped, these and similar points of doubt respecting groups so interesting. The following facts, however, are I think sufficiently decided, namely, that the three last-mentioned groups, the *Promeropidæ*, *Meliphagidæ*, and *Nectariniadæ* constitute distinct and prominent divisions in the tribe, of which by that generally stronger and more perfect† conformation, which distinguishes them from the more typical families, they form the aberrant groups; that they are united among themselves by general affinities; and that they connect the tribe on each side with the conterminous tribes that approach it, that is,

* Mr. Lewin, in the generic description of *Meliphaga* in his "Birds of New Holland," has strongly pointed out this character.

† In a group, which is itself aberrant in a division of a higher denomination, the typical forms will necessarily be more imperfect than those which deviate from the type, whenever the latter are more nearly united to the more perfect groups of the higher division: in this case the minor aberrant groups will partake in some degree of their perfection; while the former, situated most remotely from them, will of consequence partake of it to a less extent.

with the *Scansores* at the one extreme, and with the *Fissirostres*, where we first entered on the order, at the other.

It will thus afford some recompense to the labours of those who may have accompanied me so far in my progress through the different tribes of the *Insessores*, to find the extremes of that order thus connected together, and the whole of the affinities by which its various groups are linked to each other thus existing in beautiful harmony. For the more perfect intelligence of those who may wish to see at one view how these groups are united, I shall submit the following table to their inspection, which will at the same time serve to explain some curious particulars that attend the distribution of these *Perchers*.



Among the advantages derived from an inspection of the foregoing diagram is that of our being able to discern at one view the gradual deviation which takes place in the various groups from the more typical form and character of the order. If we fix our attention steadily on the central and typical group of *Conirostres*, we may trace out at a glance the limits by which that perfect formation depending upon the more important characters is partially preserved, or entirely lost, according as the groups we examine are more or less in its vicinity. Let us select, for instance, such essential characters as strength and regular construction of the bill and foot, the powers of the voice, or the organs of digestion. We see the first of these characters, the perfect bill of the *Conirostres*, preserved in the neighbouring *Scansores*, though partially superseded by the use of the tongue in the *Picidæ* and *Certhiadæ*, until it is entirely lost in the *Tenuirostres*, and the typical families of the *Fissirostres*. We see it again recovered in those aberrant families of that tribe which join the *Dentirostres*, where the perfect form re-appears, though the strength is not equal to that found in the typical tribe of the order. The perfect foot again may be perceived to become in some measure defective in the *Scansores*, to be entirely lost in the types of the *Tenuirostres* and *Fissirostres*, and finally to be resumed as we come round by the *Dentirostres* to the tribe from which we set out. We may again mark out, on examining this diagram, how far the more perfect powers of voice that distinguish the typical groups of the *Conirostres*, are communicated to the neighbouring families on each side; such as the *Psittacidæ* among the *Scansores*, the *Merulidæ* and *Sylviadæ* among the *Dentirostres;* but how completely they are lost in the remoter families. The same observation may be made respecting the more extensive powers of digestion which distinguish the omnivorous families of the same typical tribe. These powers are perceived to be singularly deficient in the remote groups of

the *Tenuirostres* and *Fissirostres*, which for the most part confine themselves to one species of food, whether animal or vegetable. While the *Scansores* and *Dentirostres*, holding an intermediate station between the extremes, are intermediate also in the extent of their food; fruit and berries being added to the animal food of the rest in some families, and in those more particularly which are contiguous to the omnivorous typical tribes.

The foregoing figure affords, moreover, an opportunity of observing some striking analogies between different groups in the order. It has been remarked by the author of the "*Horæ Entomologicæ*," who was the first to exhibit the relations of nature in a similar geometrical figure, and thus almost to reduce the science of natural history to geometrical precision, that, in figures constructed as the above, representing a series of circles united by affinities, the external groups of one circle always bear an analogy to the corresponding groups of those which are contiguous*. This analogous connexion serves to point out the causes of many important coincidences among the different groups of the *Insessores*. It explains the reason why the *Picidæ* on the one hand, and the *Trochilidæ* and *Cinnyridæ* on the other, families otherwise totally differing in their food and habits, should yet resemble each other in the common use to which they apply the tongue. It explains why the *Trochilus*, the *Hirundo*, and the *Caprimulgus* should be assimilated in the feebleness and almost uselessness of the bill; that of the former being but a sheath to defend the tongue, that of the latter but a secondary fence to prevent the escape of the prey. It accounts for the characters of the genus *Hirundo* being so far transferred to the *La-*

* See *Horæ Entomologicæ*, p. 396, where the meaning of an *external* group is explained. In the foregoing diagram the *Picidæ*, *Cinnyridæ*, *Trochilidæ*, *Hirundinidæ*, *Caprimulgidæ*, *Laniadæ*, *Merulidæ*, *Sturnidæ*, *Corvidæ*, and *Psittacidæ*, are the *external* families. They comprise, in fact, the typical groups of each tribe.

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niadæ as to confer the appellation of "*Piegrieches Hirondelles*" upon one of the groups of this family. It gives an equal insight into the reasons why the *Merulidæ* and *Sturnidæ* should have been so closely united in the earlier systems, and some of their various groups so frequently confounded together; why, in particular, Linnæus should have placed in one and the same genus the *Icteri*, that belong to the *Sturnidæ*, and the *Orioli*, that come naturally among the *Thrushes;* and why, again, *Pastor* and *Lamprotornis* should so long have retained their station in the latter group. The same consideration still further points out the cause of the similarity between the *Corvidæ* and *Psittacidæ* in their relative perfection of form and structure; and explains why the family of *Psittacidæ*, though not the most perfect or typical with reference to its own tribe, as it yields to the *Picidæ* in this point of pre-eminence, is yet more perfect and typical than that family with reference to the character of the order, in consequence of its analogy to the *Corvi*. Many other similar coincidences and similar analogies will suggest themselves to the reader here, as well as in the internal groups of the circles.

There is another point of view in which the foregoing diagram is of service to the inquiries of the ornithologist. It points out the union of different groups with respect to characters not sufficiently essential, or too artificial to form the basis of a natural arrangement; but which are yet important enough to force themselves upon our notice, and which have, in fact, formed in many instances the foundation of well-received systems. On consulting the above table, we shall perceive that the principles, which I have endeavoured to illustrate, provide for due attention being paid even to such minor characters by the juxta-position of the groups in which they predominate; and consequently, that the mode of grouping which these principles dictate, combines every advantage of artificial as well as of natural arrangement. Were

we

we inclined, for instance, to fix our attention upon one character only, such as that of the powers of the voice, we might draw a line across the contiguous tribes of *Dentirostres*, *Conirostres*, and *Scansores*, which would separate into one group all the birds which are endowed with the faculty of singing or talking. The *Merulidæ*, *Sylviadæ*, *Fringillidæ*, the *Sturnidæ*, *Corvidæ* and the *Psittacidæ*, would thus be segregated from the rest as exclusively distinguished by these characters; the three former including all the birds which are capable of producing the notes peculiar to the class, the three latter all those which can imitate the voice of man. Were we, again, to make such a character as that of feeding on the wing the foundation of a group, we might equally set apart all the birds accustomed to that mode of life by a circular line, which would include within its circumference the contiguous families of *Cinnyridæ* and *Trochilidæ*, all the *Fissirostres*, together with the *Muscicapidæ*, in conjunction with the *Tyranni*, *Dicruri*, and the *Piegrieches Hirondelles* which adjoin them. We might resort to the same mode of grouping various contiguous families by means of such characters as climbing while they take their food, of using their tongues when feeding, of possessing gressorial feet, and numberless similar peculiarities both of anatomy and economy, on which I cannot at present dwell, but which will readily suggest themselves to the experienced ornithologist. It is thus, in fact, that by following not the arbitrary division of organs or properties, but their method of variation, we can reconcile the different modes in which systematists, from adopting partial views of their subject, have separated or united their various groups. And thus it is, that, while we admit their views to be partially correct, we have some grounds for drawing the conclusion, that the more comprehensive mode of combination which embraces all their various plans and reconciles their otherwise discordant systems, has some claim to be considered

considered as approaching most nearly to the general distribution of Nature. Let us refer to the foregoing table, and compare with it, for instance, the eleven orders into which M. Brisson distributed the birds which correspond with our *Insessores*. All his separate subdivisions, detached and unconnected in his system by any mutual bond of affinity, until here linked together in one uninterrupted series, may be recognised in the table before us, as forming contiguous groups, united by relations either of true affinity, or of apparent affinity, but real analogy. The same observations may be equally made with respect to the seven orders into which M. Temminck has separated the same tribes, the names of which, *Omnivores*, *Insectivores*, *Granivores*, *Zygodactyles*, *Anisodactyles*, *Alcions*, and *Chelidons*, will at once suggest those particular groups in the above figure with which they correspond. We may extend the same remarks, with some slight modification, to the two orders, and sixteen families into which M. Illiger has subdivided the same groups; to the two tribes and twenty-eight families of M. Vieillot; and the two orders and five families of M. Cuvier. It is particularly gratifying to be able to assert, that the two orders of *Picæ* and *Passeres*, into which Linnæus disposed the present families, also form contiguous groups in the foregoing figure, which divide it into two nearly equal departments. If we take away the *Laniadæ* from the families before us, which, it is to be recollected, that great naturalist arranged among his *Accipitres* in the last edition of his "*Systema Naturæ*," and draw a line which separates the greater part of the *Sturnidæ*, together with the *Fringillidæ* and *Loxiadæ*, the whole of the conterminous *Dentirostres*, and the typical families of the *Fissirostres* which adjoin them, we have the Linnean *Passeres* grouped together on one side of the line, and the *Picæ* on the other. It is to be remembered, that the two orders of the Swedish naturalist have been pronounced by the

the highest authority, that of M. Cuvier*, to offer no decidedly distinctive characters by which they may be kept apart; and certainly, on considering the two divisions as they are distinguished from each other, the Linnean mode of grouping them appears at first sight to be perfectly arbitrary. Is it then to an accidental coincidence that we have to ascribe the singular conformity that thus presents itself between the views of Linnæus and those which are disclosed in the foregoing table of affinities? Or may we infer that this great inquirer into Nature had on this occasion pursued somewhat of a similar mode of consulting her, had obtained a glimpse of the same affinities by which she unites her groups, and of the same contiguous stations in which she disposes them—and that he drew his line of demarcation accordingly? I dwell with the more satisfaction on this point, as it confirms the views which I entertained when I ventured to differ from that great authority in uniting his two orders into one; and proves that my decision originated in no theoretical desire of limiting the orders of the class to five. I refrained, at the time I originally hazarded that opinion, from dwelling with any particularity on the chief reason that swayed me; I mean the necessity of preserving in one inviolate series the relations of affinity by which the entire of the group seemed united. I may now urge that argument with more consistency and more effect. What would then have been but mere assertion, has now somewhat of the authority of proof. And the reader who casts his eye over the foregoing table will acknowledge, that to withdraw any important department from the group, to make any material subdivision that would affect its integrity, would create a chasm in the now uninterrupted chain of affinities by which Nature seems to have brought her families together—would disturb the beautiful symmetry in which she

* See p. 403, Note *.

has

has combined them—and scatter the disjointed elements of an otherwise harmonious structure in endless and irretrievable confusion.

But there is another peculiarity attending the groups of *Insessores* on which I must detain the attention of my readers for a moment before I quit the order. It has been remarked by the author to whom I have so frequently alluded, and who, in the splendour which has attended his own progress, has diffused sufficient illumination around to direct the researches of his more humble fellow-labourers in the conterminous fields of science,—it has been remarked*, I say, by that accurate observer, that among the five subdivisions of any important and typical group, one will always be found to contain characters peculiar to this group itself, and the other four will represent the four contiguous groups that are of the same degree with it. The following series of parallel analogies, by which the tribes of the *Insessores* thus represent the different orders of the class, will tend to unfold many striking coincidences and reconcile many apparent anomalies in the groups of ornithology.

Dentirostres	RAPTORES.
Conirostres	INSESSORES.
Scansores	RASORES.
Tenuirostres	GRALLATORES.
Fissirostres	NATATORES.

The *Conirostres* are the typical group in the first series, and as such exhibit a character peculiar to themselves, the strength and more perfect formation of those organs, and the greater developement of those faculties which distinguish the *Insessores* from the other orders. The analogical relations that connect the other four opposite groups will serve to explain the cause

* See *Horæ Entomologicæ*, p. 518.

why the *Dentirostres* should be characterized by the *raptorial* peculiarity, the mandibulary notch; why some families of the tribe, even down to the smallest *Pari**, should have a tendency to attack and prey upon the weaker animals; and why, from their conformity in such habits, the *Laniadæ* should have been so frequently confounded with the groups of the *Raptores*. They demonstrate the cause why such birds as the *Musophaga* and *Corythaix*, so nearly and evidently allied to the *Gallinaceous* families, should be found among the *Scansorial*; and why the *Scansores*, to make a selection from many characters which they possess in common, should be distinguished by the short wings and heavy flight that characterize the *Rasores*. They explain the identity that exists between the typical families of the *Tenuirostres* and the *Grallatores* in the *suctorial* manner of obtaining their food, and the cause why both should be distinguished by a corresponding length and slenderness of bill. The same considerations of analogy illustrate the general tendency which the families of the *Fissirostres* exhibit to resort to the neighbourhood of waters; why their nests should be so frequently constructed in their vicinity; why the *Hirundo* should pursue its prey along their surface, and the *Halcyon* seek its food from their depths. They explain, on the other hand, why the wide gape and short tongue of the *Fissirostral* families should be observable in the *Pelicanidæ*, and the consequent conformity that exists between the two groups in their mode of gulping down their prey; why the *Terns* should be commonly denominated *Sea-swallows*; and why the variation in the form of the tail among the *Perching* birds which feed upon the wing, should be equally discernible among the *Natatorial* families; the *Phaeton* and *Tachypetes* exhibiting

* Ils (les *Mesanges*) se nourissent d'insectes, —— les petits oiseaux maladifs devient aussi leur proie, elles les achèvent en leur ouvrant la crâne.—*Temm. Man. d'Ornith.* p. 286.

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the extremes of that varied structure. With almost equal certainty they reduce to the regularity of law the otherwise anomalous formation of the *Tachypetes*, explaining its connexion with *Hirundo*, and accounting for the weak and feathered legs, the forked tail, the expansive wing, the powers of the long-suspended flight, which give each bird the command over the element in which they range in common. But I must restrain myself, or I should be involved in an endless discussion of similar coincidences. It is sufficient to have suggested the principles that regulate such analogies, and the intelligent ornithologist will himself discern the numberless and beautiful inferences that result from them. Proceed we now in order to the next succeeding department of the class.

Ord. III. *RASORES.*

The two typical orders which have already come before us exhibit the most generally perfect structure that is found among birds, and consequently indicate the most extensive powers, and the widest sphere of action. The strength and perfect developement of their wings confer on them the faculty of locomotion to the fullest extent; while the structure of their foot affords them equal facility in grasping their prey, in walking, climbing, and perching. They thus extend their dominion over nature almost without any apparent limits. The different elements seem alike subservient to their purposes: on land, they form their habitations and obtain their food in the forest, on the plain, and the mountain; they pursue their prey through the tracts of air, and are not debarred even from the waters. Pursuing the same line of inquiry among the aberrant groups of the class, we may observe their powers which depend on conformation becoming more circumscribed, and their sphere of life brought conse-

quently within narrower limits. As we approach the *Rasores*, the order into which the plan of our inquiries now introduces us, we may at once notice the short wings and heavy mode of flight which prevail throughout the generality of the families that compose it; and we may even observe this deficiency still further becoming more evident, until the faculty of flying is entirely lost in one of the most conspicuous groups of the order. If we examine the internal anatomy of these birds, we shall perceive that, as far as it is conducive to the faculty of flight, it evinces a still more striking deficiency, than even their external appearance. Perhaps the most essential distinction between birds and the other vertebrated animals consists in the powers of their wings; and the difference in their osteology is conformable to this characteristic distinction. Their skeleton differs from all others by the peculiar formation of two important bones, the *os furcatorius* and the *sternum*, to which the muscles of the wings are attached. The first of these bones is always more or less robust in itself, and more or less strongly connected with the *sternum*, according as the bird possesses more or less capability of flight; and the latter is furnished with a projecting process or keel, which is also more or less elevated, according to the greater or less prevalence of the same capability. Now, on examining the *Gallinaceous Birds*, we find that these bones in general are small and feeble. The *os furcatorius* is attached to the *sternum* by a weak ligament; and the *sternum* itself is diminished in extent by a groove on each side, which considerably affects its strength. In one of the families of the order, the *Struthionidæ*, both the *os furcatorius* and the projecting keel of the *sternum* are entirely wanting, and the *sternum* itself, assuming the appearance of a simple flat buckler, exhibits the rudiments only of that structure which is peculiar to birds. The insufficiency of these members to support the birds of the order before us to any height, or for any

any constancy, in the air, indicates their station in nature to be chiefly limited to the ground. And suitably to that wise and merciful disposition prevalent throughout the creation, which compensates for every deficiency by some counterbalancing advantage, those parts of the structure of the *Gallinaceous Birds* which are more necessary to them in their peculiar station, and more conducive to their support in life, are endowed with superior strength and powers in proportion to the inferiority which may exist in the organs of flight. Their legs and feet are strong, and furnished with the most powerful muscles; their nails are short, blunt, and robust, for the purpose of scratching up their food; and a connecting membrane unites the base of the toes sufficiently developed to strengthen their action, but not sufficiently extensive to interfere with the freedom of the joints. The form and situation of the hind toe is especially suited to their station in nature. In reference to its general use, this member seems chiefly calculated to aid the foot in grasping an object; and thus it is of important service to a bird in holding its prey or in perching. But neither of these purposes is suited to the mode of life of the *Rasores;* and the perfect developement of the member in question would proportionally diminish the strength of the fore toes, as well as impede the progress of the bird upon the ground. The more, therefore, that we perceive the strength of the hind toe to be transferred to those in front, the greater may we pronounce the powers of the rasorial foot to be in its own peculiar region, and the closer its adaptation to the habits of running that characterize these groups. In fact, we may observe that the more typical *Rasores* seldom walk, but are found almost invariably to run even in their most ordinary movements. In this point of view the hind toe, although an apparently trivial and unimportant member, becomes of considerable consequence in affording a character to judge of the relative situation of the different families in the

the order. Keeping, then, these characteristic peculiarities of the *Rasores* steadily in view, we may draw the conclusion that the typical groups will be those which, in reference to external character, may be distinguished by the weak conformation of the *hallux* or hind toe, and the height on which it is articulated upon the *tarsus*. The aberrant groups will in like manner be either those whose hind toes are more developed, and articulated lower down upon the *tarsus*, and which thus retain most closely the habits of the *Perchers;* or those which, though they possess no hind toe, and thus seem to partake most strongly of the typical character of the order, are yet found to deviate from it in the length of the *tarsus*, by which character they lead off to the *Waders*. Following these views of arrangement, we may group the *Rasores* as follows, placing the typical families in the centre*:

Columbidæ, Leach.
Phasianidæ.
Tetraonidæ, Leach.
Struthionidæ.
Cracidæ.

I have already observed, when speaking of the affinities which connect the orders of Birds together, that the *Columbidæ* form the passage from the *Insessores* to the *Rasores* by their habits of perching and their powers of flight. The hind toe is articulated as in the *Perchers*, and their *tarsi* are shorter, more particularly in the

* Or, with reference to their normal and aberrant groups, thus:

Normal group.

Halluce brevi, amotâ; tarsis præcipue calcaratis . . . . { *Phasianidæ*. *Tetraonidæ*.

Aberrant group.

Halluce aut nullo, aut plus vel minus terræ incumbente; tarsis nunquam calcaratis. { *Struthionidæ*. *Cracidæ*. *Columbidæ*.

earlier

earlier groups, than those of the *Gallinaceous Birds* in general. The first group which we meet in this extensive family is the genus *Vinago* of M. Cuvier, the bills of which, stronger and more solid than they are usually found to be among the Pigeons, unite them to *Penelope* and *Crax*, which form the opposite extreme of the present order, as well as to *Musophaga* and *Corythaix*, which approach, as we have seen, the whole of the groups before us, and connect them with the *Perchers*. From this genus *Vinago*, which seems confined to the southern divisions of the Old World, we may observe a series of groups leading gradually to the true *Columba*, of which genus the European species *C. œnas*, Linn. may be considered to form the type. Hence we are led by several intervening species to the "*Columbi-Gallines*" of M. Le Vaillant, which, still retaining the soft and flexible bill of *Columba*, approach the typical *Gallinaceous Birds* in their more elevated *tarsi*, and in their habits of living in company and seeking their nourishment chiefly on the ground. Among these may be noticed some forms, *C. Nicobarica*, Linn., and *C. carunculata*, Temm., for instance, which possess the feathered appendages, together with the naked face and caruncles of the Linnean *Gallinæ;* and another group, the *Lophyrus* of M. Vieillot, which exhibits the size and general form of the same birds, as well as the singular plumes which frequently decorate their head. This last-mentioned genus, formed of the *Crowned Pigeon* of India, possessing the strongly-formed leg and foot of *Meleagris*, Linn., but without the spurs, while at the same time it retains the bill of *Columba*, may be observed to open the passage immediately from the present to the succeeding family.

The genus *Meleagris* thus introduces us into the family of *Phasianidæ*. In conjunction with *Pavo*, Linn., and *Polyplectron*, Temm., that genus commences the present group by the greater length of the hinder toe, in which character it resembles the

the family we have just quitted, with the exception of its being articulated higher on the *tarsus*. The genus *Lophophorus* of M. Temminck, which is represented by the *Impeyan Pheasant* of our cabinets, and the genus *Gallus* of M. Brisson, appear to hold an intermediate station, with respect to these characters of the hind toe, between the groups just mentioned and the true *Phasianus*, which forms the type of the family. Some groups deviating from the latter genus, among which is the *Argus* of M. Temminck, unite themselves to *Numida*, Linn., by the absence of the spur on the *tarsus*. The last-mentioned genus reconducts us again to *Meleagris*, which it resembles in general appearance, while at the same time it approaches it with reference to the integrity of the *tarsus*, that of the true *Meleagris* possessing but a short and blunt excrescence, which exhibits only the rudiments of a spur.

The groups of the *Tetraonidæ* are chiefly distinguished in modern systems from those of the *Phasianidæ* by their more simple appearance; by the absence, in fact, of those ornaments to the plumage, and those naked or carunculated appendages to the cheeks and head, so conspicuous in the latter family, but which are reduced in the present to the mere space that encircles the eye. The still weaker conformation of the hinder toe tends further to separate them. In the *Tetraonidæ* this member becomes shorter and gradually weaker, until it is completely lost in some of the groups. In this point of view the family before us holds an intermediate station between the *Phasianidæ*, where the hind toe, although articulated high on the *tarsus*, is yet comparatively strong, and the *Struthionidæ*, where it is generally, if not always, deficient. The groups that compose the *Tetraonidæ*, corresponding with those which form the genus *Tetrao* of Linnæus, seem to be immediately united to the preceding family by means of the genus *Cryptonyx*, Temm., which resembles

resembles them in the similar appendage to the plumage of the head. This group leads directly to *Coturnix*, Briss., and the true *Perdix*, where it has indeed been generally arranged, and from which it has been chiefly separated by the defalcation of a nail to the hinder toe. From *Perdix* we proceed to *Pterocles*, Temm., which, by its half-plumed *tarsus*, is intermediate between that genus and the true *Tetrao*. By means of *Lagopus*, Cuv., in which the toes as well as the legs are feathered, we arrive at the singular genus *Syrrhaptes* of M. Illiger, which is immediately connected with the *Ortygis* of the same author, by the entire deficiency of the hind toe. With these groups the genus *Tinamus*, Lath. corresponds by the slight conformation of the same member, the joint of which is feeble, and the nail scarcely developed. This group leads us back again to *Cryptonyx*, which we may remember has no nail to the joint of the hinder toe. The whole of these last-mentioned groups thus united correspond also in the shortness and weakness of their tails.

Those birds of the latter family, which exhibit a weakness or a deficiency in the hinder toe, lead us at once to the three-toed groups of the *Struthionidæ*, with the bills of which, more particularly that of *Rhea*, those of some species of *Tinamus* correspond*. This family contains the "*Brevipennes*" of M. Cuvier, together with the genus *Otis* of Linnæus, which evidently agrees with them in their principal characters. It corresponds also with the order "*Cursores*" of M. Temminck, with the exception of the genus *Cursorius* of Dr. Latham, which possesses more of the characters of the *Wading* than of the *Gallinaceous* order; but with which the present family will still be found to preserve its affinity by means of that circular disposition which has hitherto been seen to prevail throughout the divisions of ornithology.

* Rostri (sc. *Crypturi*, Ill., *Tinami*, Lath.,) mira conformitas cum rostro *Rheæ* est. *Illiger, Prod.* p. 245.

The chief genera comprised in the *Struthionidæ* are the *Rhea*, Briss., which unites this family with the last; the *Struthio*, Linn., which having but two toes, and thus carrying the character of the group to the extreme, may be considered the type; the *Casuarius*, Briss., *Dromiceius*, Vieill., and *Otis*, Linn. Considerable doubts have arisen as to the present existence of the Linnean *Didus;* and they have been increased by the consideration of the numberless opportunities that have latterly occurred of ascertaining the existence of these birds in those situations, the Isles of Mauritius and Bourbon, where they were originally alleged to have been found. That they once existed I believe cannot be questioned. Besides the descriptions given by voyagers of undoubted authority, the relics of a specimen preserved in the public repository of this country bear decisive record of the fact. The most probable supposition that we can form on the subject is, that the race has become extinct in the before-mentioned islands, in consequence of the value of the bird as an article of food to the earlier settlers, and its incapability of escaping from pursuit. This conjecture is strengthened by the consideration of the gradual decrease of a nearly conterminous group, the *Otis tarda* of our British ornithology, which, from similar causes, we have every reason to suspect will shortly be lost to this country. We may, however, still entertain some hopes that the *Didus* may be recovered in the south-eastern part of that vast continent, hitherto so little explored, which adjoins those islands, and whence, indeed, it seems to have been originally imported into them. I dwell upon these circumstances with more particularity, as the disappearance of this group gives us some grounds for asserting, that many chasms which occur in the chain of affinities throughout nature may be accounted for on the supposition of a similar extinction of a connecting species. Here we have an instance of the former existence of

a species

a species that, as far as we can now conclude, is no longer to be found; while the link which it supplied in nature was of considerable importance. The bird in question, from every account which we have of its economy, and from the appearance of its head and foot, is decidedly gallinaceous; and, from the insufficiency of its wings for the purposes of flight, it may with equal certainty be pronounced to be of the *Struthious* structure, and referable to the present family. But the foot has a strong hind toe, and, with the exception of its being more robust,—in which character it still adheres to the *Struthionidæ*,—it corresponds exactly with the foot of the Linnean genus *Crax*, that commences the succeeding family. The bird thus becomes osculant, and forms a strong point of junction between these two conterminous groups; which, though evidently approaching each other in general points of similitude, would not exhibit that intimate bond of connexion which we have seen to prevail almost uniformly throughout the neighbouring subdivisions of nature, were it not for the intervention of this important genus.

The family of *Cracidæ*, thus connected with the *Struthionidæ*, are separated from the typical groups of the order by the length and robustness of the hinder toe, and by its being situated more nearly on a level with those in front. These birds, placed in this manner at the extreme of the present order, assume more of the habits and appearance of the preceding order of *Perchers* than the other *Rasores*, with the exception of the family of *Columbidæ*. They are found most frequently to make their abode in trees, and to resort to the neighbourhood of forests: in the lesser number of their tail-feathers they evince an equal deviation from their more typical congeners, and they never possess a spur. This family contains the *Ourax* of M. Cuvier, and the true *Crax*, Linn., together with the *Penelope* and *Ortalida* of M. Merrem. The two latter genera have their hind toe articulated on a

level with the front toes, and thus reconduct us to the *Columbidæ*. Their bills also, more lengthened than those of *Crax*, approach most nearly to those of the *Pigeons*, which, on the other hand, seem to meet them by the stronger form and curvature of the bill of *Vinago*, which deviates in these particulars from the general structure of its own family. The genus *Ortalida* in particular, the feathered cheeks of which are distinguished from the naked face of *Penelope*, brings us in immediate contact with that family. Here it is, in this extreme of the order, that I would assign a place to the beautiful New Holland genus *Menura*, Lath., a group that has hitherto afforded more difficulties to the systematic writer than any other in the class. By modern authors it is generally placed among the *Perchers**, on account of the length and low position of the hind toe. But its habits and manners are gallinaceous, as far as we can ascertain†, and its general appearance decidedly evinces an affinity to the *Rasores*. The deviation in the structure of the foot from that of the typical *Rasorial* groups only indicates its being placed at a distance from them, and in that extreme of the order which connects itself with the conterminous order of *Perchers*. The same deviation, it has been seen, is found in other groups of its own family, and in the adjoining family of *Columbidæ*. A group

* M. Temminck places this genus in his order "*Insectivores*" in the midst of the *Thrushes*, and in the following succession: *Turdus, Cinclus, Menura, Pitta*, &c. (*Man. d'Orn.* p. lvi.). M. Cuvier assigns it a nearly similar situation (*Regne Anim.* i. p. 361.). M. Vieillot, on the other hand, though he includes it in his second order, which corresponds with our *Insessores*, places it at the extremity of it, and near the groups of the *Columba* and *Penelope*. (*Analyse d'une Nouv. Orn. Elem.* p. 48.). His views thus nearly correspond with mine. M. Illiger has at once ranked it with the *Rasores*. (*Prod. Mam. et Av.* p. 241.).

† Mr. Caley informs me, that, from the observations he was enabled to make on these birds during his stay in New Holland, it is his opinion that they are gallinaceous. He generally found them, he tells me, in flocks, and for the most part on the ground.

newly

newly discovered in some islands of the Eastern Archipelago, the *Megapodius* of M. Temminck, serves strongly to illustrate these principles, and to corroborate my opinion as to the situation of the singular New Holland genus before us. The *Megapodius*, brought home to France by one of her late expeditions, is confessedly gallinaceous in its habits, and as such has been placed without hesitation among the true *Rasores;* and yet its foot is precisely of the same construction* as that of *Menura*. The bill also shows no very material difference from those of the extreme groups of the *Cracidæ*. To return, however, to the general affinities of the family, it may again be repeated, that all the latter genera, thus united among themselves, evince an evident approach to the *Columbidæ*, from which, it may be remembered, we commenced our observations on the order. The whole of the groups of the *Rasores*, thus following each other in continued affinity, preserve their circular succession without interruption.

Ord. IV. *GRALLATORES.*

The birds of the next succeeding order, another of the aberrant groups of the class, exhibit an equally circumscribed sphere of action as those of the order we have just quitted. Holding an intermediate station between the *Gallinaceous* birds, which we have observed to be confined to the land, and the *Natatorial* groups, which are confined to the water, their typical groups

* "Tous les doigts (sont) longs, le posterieur posant à terre dans toute sa longueur." *Temm.* Art. *M. Freycineti.* Pl. Col. 220.—The habit of these birds of leaving their eggs on the ground and deserting them, unlike the typical groups of the order, affords an additional reason for placing them in an extreme division. In this respect they evince an affinity to some of the *Struthionidæ*, another aberrant group. See *Temm. ubi sup.*, and *Cuv. Regne Anim.* i. p. 461.

appear

appear to be those which partake most equally of the advantages of both elements; and the aberrant groups those which discover a more predominant inclination to either. Of the five families into which the order before us branches out, we may, in this point of view, pronounce those two to be most typical which inhabit the land, but derive their support from the water; or, to speak more correctly, which derive their whole support from the latter element, without possessing those powers of swimming or diving which are peculiar to the true water-fowl. The exclusive food of such groups will be fish, water reptiles and insects, mollusca, and animalcula; and their distinguishing external characters, length of legs and bill,—the former for the purpose of wading, the latter for that of seizing their prey, or of extracting it by suction from the waters or marshes. Of the three remaining families, two, as I have observed in an early part of this inquiry, will be found to deviate from the more typical, in their food and manners being more terrestrial, and their general appearance and structure more conformable to that of some groups of the preceding order of *Rasores*: while the third, by its capability of swimming and the rudiments of the natatorial membrane that connects the fore toes of some of its species, equally deserts the same type, and goes off, on the other hand, to the *Natatores*. Taking these peculiarities into consideration, we may venture to view the order according to the following arrangement, placing as usual the more typical families in the centre*:

* The following disposition distinguishes the normal and aberrant families:

Normal group.	
Rostris longis, ad sugendum præcipue idoneis	*Ardeidæ.*
	Scolopacidæ.
Aberrant group.	
Rostris brevibus, ad captandum, haud sugendum idoneis . .	*Rallidæ.*
	Charadriadæ.
	Gruidæ.

Gruidæ.

Gruidæ.
Ardeidæ, Leach.
Scolopacidæ.
Rallidæ, Leach.
Charadriadæ, Leach.

The species that enter into the family of *Gruidæ*, most of which were comprised originally in the genus *Ardea* of Linnæus, are separated from the remainder of that group by their food, which is chiefly vegetable; their manners, in which they approach nearer the land-birds; and the formation of their bills and feet, the former of which are more obtuse at the end, and the latter more short than is observable in the true *Ardeæ*. In these characters, as well as in their general appearance, more particularly with respect to their plumage, they have a near alliance, as has been elsewhere observed, with the *Struthionidæ* of the preceding order. The first group that meets our attention in this family is the *Psophia* of Linnæus. This genus, in the comparative shortness of the bill, is connected with *Anthropoïdes* of M. Vieillot, the type of which is the *Demoiselle* of Numidia so distinguished in our menageries by its graceful form and gestures. The *Crowned Crane* of Africa, equally familiar to our cabinets and menageries, the *Ardea pavonina* of Linnæus, unites this genus to the true *Grus* of the present day. If the genus *Dicholophus* of M. Illiger be found to belong to the *Wading Birds*, of which I have little doubt, its situation will most probably be in the present family, to which it bears a nearer resemblance in plumage and general structure than to any other division of the order. In this case it will form a more immediate link than any group at present known in the family with the *Charadriadæ*, which meet it at the corresponding extreme of the order; its shorter and more elevated hind toe forming the passage between the fully tetradactyle foot of the *Gruidæ*, and the tridactyle foot of the *Charadriadæ*.

M. Cuvier

M. Cuvier has noticed* the union that takes place between the last groups and those of the *Ardeidæ* by means of the genera *Aramus*, Vieill., and *Eurypyga*, Ill. These lead to the extensive assemblage of species contained under *Ardea*, Linn., and *Ciconia*, Briss., both of which groups are connected by their general form and habits, but differ by some minute yet strongly-marked generic distinctions. Intermediate between *Ardea* and *Ciconia* appear those forms which display so remarkable a dilatation of bill, the *Cancroma*, *Phœnicopterus*, and *Platalea* of Linnæus. The two last of these groups are equally distinguished by a greater developement of the membrane that connects the toes, than is observable in the other *Waders* which join them on each side; and in one of them, the *Phœnicopterus*, this character is carried so far to the extreme, as to have occasioned some systematists to place the birds of the genus among the *Natatores*. But the whole of the family have a membrane more or less extensive at the base of the toes: and if we compare the feet of the common *Ciconia alba*, of the *Platalea*, and the *Phœnicopterus* together, we shall see a gradual increase of this membrane in extent until it reaches the extreme in the latter genus. Among the groups that are allied to *Ciconia*, there are many that resemble it in general character, but deviate from it by the form of the bill. Among these we may particularize *Scopus*, Linn., distinguished by its more compressed and furrowed mandibles; the *Mycteria*, Linn., where the point of the bill turns upwards; and the *Anastomus*, Ill., where the mandibles, united at the base and the point, leave an open space in the centre. The genus *Tantalus*, Linn. bears an evident affinity to the same group, and has consequently been united to it in the arrangement of every systematic naturalist. It differs chiefly by the downward curvature of the bill. To this genus may be united the *Ibis* of M. La-

* *Regne Anim.* i. p. 473.

cepede,

cepede, which in its more slender bill bears an affinity to *Eurypyga*, from whence we commenced our inquiries into the family.

Proceeding in the same course of observation, we may trace out the distinction between the family of *Scolopacidæ* and the groups we have just quitted, in the weakness and elevation of the hinder toe, and the slenderness and flexibility of the bill. The latter character is more particularly conspicuous in the typical species, which make use of the flexible bill in penetrating the mud and soft spongy marshes whence they extract the worms, insects, smaller mollusca, and animalcula, that chiefly constitute their food. The family is united to the *Ardeidæ* by means of *Numenius*, Briss., which approaches *Ibis* most closely in its bill. By means also of the immediate connexion of *Ibis* with the genera *Eurypyga* and *Aramus*, the *Scolopacidæ* preserve their affinity to those groups, with which indeed their appearance has generally associated them. This may be inferred from the generic or specific name originally conferred upon each of these groups; the former genus being formed of the *Scolopax helias* of M. Pallas, or the *Caurale Snipe* of Dr. Latham's *Synopsis;* and the latter of the *Ardea scolopacea* of Linnæus. We cannot have a more accurate guide through the affinities of this extensive family than M. Temminck, whose opportunities of observing the habits and characters of the birds of the present order have been so extensive, and whose ability and industry in improving these opportunities have been so fully exerted, as to leave little room for further observation on the subject, as far at least as regards the European species. Following his views, with some slight modification, we may remark, that from *Numenius* we pass on to *Totanus*, Briss., the bill of which, comparatively robust at the point, holds a middle situation between the strong bill of that genus and the entirely flexible bill of *Limosa*, Briss. The genus

Recurvirostra of Linnæus appears to come naturally among these groups, and to be intermediate between *Totanus* and *Limosa*; with the former of these it is connected by the structure of the foot, the *Totanus semipalmatus* of M. Temminck almost immediately meeting it; while with some species of the latter it is equally associated by the turned-up bill. The latter genus, *Limosa*, unites itself to the true *Scolopax*, Auct., by the flexible nature of its bill; a character which prevails through the remaining groups of the family. *Scolopax* leads to *Tringa*, Linn., through the medium of *Rhynchæa*, Cuv., which approaches the whole of the latter genus by its shorter bill, and agrees in particular with some species of it which have that member feebly curved, by the slight curvature observable at the extremity of its own. Among the groups which originally composed the *Tringa* of Linnæus, the *Phalaropus* of M. Brisson may be distinguished, which, by its lobated feet and habits of swimming, stands at the extremity of the present groups, and leads the way to the succeeding family of *Rallidæ*. The present family is united at its extremes, and the circular succession of affinities between its various groups is preserved, by means of some species of *Tringa*, whose curved bills lead back to *Numenius*, from which we started. The *Tringa platyrhyncha* of M. Temminck, the same as the *Numenius pygmæus* of the "*Index Ornithologicus*," completes the circle.

The family of *Rallidæ*, composed of the Linnean genus *Parra*, with its congeners *Palamedea*, Linn., and *Chauna*, Ill., together with *Rallus*, Linn., and *Fulica*, Linn.*, corresponds with the *Macrodactyles* of M. Cuvier. These groups are distinguished from the last family by their stronger bill and the greater length of the hind toe. They are also separated from the other birds of the order, and united among themselves by the shape of their

* I conjecture that *Chionis*, Forst. comes into this family; but I know too little of the group to speak with any confidence.

body,

body, which is compressed and flattened on the sides, in consequence, as M. Cuvier has informed us, of the narrowness of their *sternum*. Were we here allowed to draw an inference from the analogical construction of other bodies, which move with the greater facility through the water in proportion as they assume this compressed and keel-like form, we might almost conclude that this structure, peculiar to the birds of the present family, facilitates their progress through that element*, and is intended to counterbalance the deficiency in the formation of the foot, which separates them from the truer and more perfectly formed Water-birds. It is certain that the greater portion of these birds are excellent swimmers; and in such habits, as well as in the shortness of their *tarsi*, which is equally conducive to their powers in swimming, they are found to deviate from all the remaining groups of the order. They thus become an aberrant family, and lead directly, as has been before noticed, to the succeeding order of *Natatores*. The genus *Parra*, Linn., distinguished from *Rallus*, Linn. by the greater length of the toes, and more particularly by the length and straightness of the nails, is yet allied to that genus by the general structure of the bill. With *Parra* may be allied *Palamedea*, Linn., and *Chauna*, Ill., the *Parra chavaria* of the "*Systema Naturæ*," both of which seem to approach *Parra* in affinity, although the latter of them is so imperfectly known that its situation cannot be decided with certainty. To *Rallus* succeeds *Crex*, Bechst., which by its stronger and shorter bill seems to lead on to *Gallinula*, Briss., from which genus, although agreeing with it in general appearance, it is decidedly separated by its terrestrial habits. *Gallinula* is set apart from the foregoing groups by the greater length of the toes, and the dilatation of the upper mandible upon the forehead. This

* Mr. Wilson, speaking of the *Rallus Virginianus*, mentions this character as conducive to the progress of the bird through the reedy marshes. *Am. Orn.* vol. vi. p. 33.

latter character is still further developed in the ensuing genus *Porphyrio*, Briss., where the base of the bill exhibits a considerable degree of robustness; and is also carried on to *Fulica*, which immediately adjoins *Porphyrio*. The species that compose the true *Gallinula* and *Porphyrio* may be observed to possess a narrow membrane on each side of the toes, which extends along their whole length, straight and entire. We thus recognise the gradual approximation of these genera to the lobated foot of *Fulica* and *Podoa*, which unite the swimming *Waders* to the true web-footed *Natatores*. The dilatation of the upper mandible into a flat crown upon the forehead, which characterizes the latter groups of this family, together with the same length of the toes, is found to exist in some species of *Parra;* and thus we are led back to the groups from which we commenced our observations on the family.

We are introduced to the family of *Charadriadæ*, or the three-toed Waders, by means of *Hæmatopus* of Linnæus, which indicates its affinity to the lobated *Fulica* of the last division by the rudiments of the membrane that extends along the toe. This character is sufficiently discernible in the species so frequent on our coasts; but it is so far conspicuous in an Australasian species as almost to give its foot the appearance of being perfectly lobated. This genus by its habits of swimming preserves an affinity with the natatorial groups of the preceding family of *Rallidæ;* and these again being connected with *Phalaropus*, which forms an extreme genus of the *Scolopacidæ*, the whole of the *Wading Birds* that possess the faculty of swimming are brought together into one contiguous group. Besides *Hæmatopus*, the present family consists of *Arenaria*, Briss., our common *Sanderling;* to which I feel inclined to add *Strepsilas*, Ill., and *Vanellus*, Briss., which have been separated from *Tringa* and generally assigned a place near *Arenaria*. It is true that both these genera possess a hind

a hind toe; but that member is at the same time so small and feeble, as scarcely to form more than the rudiments of a toe: and in the structure of their bill, and more particularly in their habits, they evince a more natural union with the present family than with *Tringa*, where a strict adherence to the structure of the foot would place them. The genus *Cursorius*, Lath. also appears to come among these groups which are joined by the true *Charadrius*, Auct. Among the numerous species of this latter genus, some will be observed to be distinguished from the rest by the greater elevation of the *tarsi*. These lead us to the genus *Himantopus*, Briss., which exhibits such a singular and apparently disproportioned length of limb. The family is terminated by the *Œdicnemus* of M. Cuvier, which, by its affinity with the earlier groups of the *Gruidæ*, connects the present family with that which commenced the order. We may remember that the family of *Struthionidæ* among the *Rasores* is closely allied to the *Gruidæ* of the order before us, and equally so to the *Charadriadæ*, in consequence of the absence of the hinder toe. With the latter indeed it is frequently united into one group, from their similarity in this character, and the cursorial habits resulting from it, which are common to both. These three naturally allied families therefore are thus brought into contact, and their mutual affinities preserved; while at the same time they retain in the system the various stations into which the difference in their more important characters tends to separate them.

Ord. V. *NATATORES.*

The groups of the preceding order, that deviate from the typical character by their habits of swimming, naturally lead us, as I have so often repeated, to the fifth or last order of *Natatores*.

The

The former groups, however, still retain their relation to the typical families of their own order, by frequenting for the most part the inland lakes or rivers. The birds upon which we now enter become more decidedly pelagic in their food and habits; their typical station in nature appears included within the limits of the ocean, and their "business is in the great waters." We may have remarked in the course of this inquiry, that the typical families of an aberrant tribe or order are less perfect in their general conformation, than the families of the same group which deviate from the type. This is necessarily the case. The tribe or order is itself aberrant, and deviates from the more perfect structure of the conterminous tribes or orders that are typical in the more comprehensive division under which all are classed. The typical subdivisions of this aberrant tribe or order will consequently be those which carry this deficiency to the extreme. In reference then to their own division, the typical perfection of such aberrant groups will consist, if I may so express myself, in their general imperfection—their strength will be in their weakness. To instance this point we may refer to the order of *Insessores*, where the typical families of the two most aberrant tribes, the *Tenuirostres* and the *Fissirostres*, exhibit less general perfection of structure than the families which are less typical. In the former instance the *Cinnyridæ* and *Trochilidæ*, the types of the tribe, evince in their general organization a considerable degree of feebleness, both in their bills and legs, in comparison with the strength displayed in many groups of the aberrant *Meliphagidæ* and *Nectariniadæ*. We may observe the same character in the tribe of *Fissirostres* also, where the general weakness of the structure of the typical *Hirundinidæ* and *Caprimulgidæ* forms a striking contrast with the comparative strength and robustness of many species of the remoter groups *Todidæ*, *Meropidæ*, and *Halcyonidæ*. The prevalence of this principle in the groups that have already come before

before us directs us at once to the typical families of the present order. The groups that are most truly oceanic will be those which exhibit the greatest deficiency in their powers of flight and of motion on land. Thus in the typical *Natatores*, the backward position of the legs, which are thrown entirely behind the equilibrium of their body, almost totally deprives them of the faculty of walking; while their wings, considerably shorter, and less covered with feathers than those of any other birds whatever, bespeak their incapacity of maintaining a constant or sustained flight. On the other hand, these birds exhibit a superiority in the powers which contribute to their support in their own peculiar element. The feet, which by their position and structure are not calculated for the usual offices which these members perform on land, are admirably adapted to the purposes, more appropriate to the *Natatores*, of swimming and diving. In the same way the wings, which serve as feeble supporters in their progress through the air, answer admirably as fins to facilitate their movements in the water. Those birds then will form the typical groups of the present order, which, like the *Colymbus* and *Alca* of Linnæus, have short and slightly-feathered wings, and whose legs are so far thrown backward as to give them an almost erect appearance when on the ground. They will be found to be constant inhabitants of the ocean; and although in some instances, as the *Aptenodytes* of Linnæus, they are deprived of the powers of locomotion common to other birds, by the deficiency of their wings, they may yet pursue their prey at considerable distances from land. To such situations they must of course be conveyed by their superior powers in swimming. The aberrant groups, on the other hand, will be those where the powers of the wings are more considerably developed, and where the legs, thrown more forward, enable them to walk with comparative ease. They thus appear in general to come more near the land-birds than the typical families of the order.

order. Some, as for instance many groups of the Linnean *Anas*, like the *Rallidæ* of the preceding order, prefer the inland lakes and marshes to the oceanic waters; while others, as some groups of the *Larus* of the same author, are observed to feed occasionally on land. Many other deviations from the type of the order, and many approximations to the conterminous orders on both sides, will appear conspicuous as we enter into the details of the several families. The following seems to be the order of succession among these families, the names of which are taken as usual from that of the Linnean genus, which is typical in each*.

Anatidæ, Leach.
Colymbidæ, Leach.
Alcadæ.
Pelecanidæ, Leach.
Laridæ, Leach.

The family of *Anatidæ*, to which we have been led from the preceding order by means, as was originally observed, of the connexion between the *Rallidæ* and *Cereopsis*†, consists of the groups which compose the Linnean genera *Anas* and *Mergus*. It is not my intention at present to enter into any observations upon the different views which have been entertained by naturalists with respect to the classification of the former extensive genus; or to discuss the merits of the several generic divisions that have been made in it in consequence of the various distinctions in the bills and feet of the species, and the equal differences in their

* Or with reference to the typical groups:

Normal group.
Alis brevibus, parcè plumatis: pedibus extra equilibrium corporis positis . { *Colymbidæ*. *Alcadæ*.

Aberrant group.
Alis longioribus, plumatis: pedibus præcipuè intra equilibrium corporis positis . . . . . { *Pelecanidæ*. *Laridæ*. *Anatidæ*.

† See p. 416.

habits.

habits. I shall only remark, with respect to the affinities that prevail throughout the families of this order, that the more extensive subdivisions of the Linnean *Anas*, which have been acknowledged by all systematic writers, either under the name of sections or genera, display in conjunction with *Mergus* a regular series of affinities conformable to the principles I have ventured to advance as regulating the order. The first group upon which we enter in this first aberrant family of the order, has been formed into a sectional subdivision by M.Temminck, according to his peculiar mode of nomenclature, under the denomination of "*Les Oies;*" and with equal signification and more effect has been made into a genus, under the title of *Anser*, by M. Illiger, who therein followed the older naturalists that preceded Linnæus. These birds retain much of the manners of the *Waders*, from which we have lately parted. They are endowed with considerable facility in walking, are found to swim but seldom, and they do not dive at all*. In these characters, as well as in other particulars to be observed hereafter, they correspond with the family of *Laridæ*, which meets them at the other extremity of the circle of *Natatores*. To this division succeeds *Cereopsis*, Lath., strongly allied to the preceding *Anseres* by its general structure, but still more typical in the family in consequence of the length and nakedness of the *tarsi* above the knee: characters which indicate a greater power of walking, and a greater deficiency in swimming. It joins the third division, or the genuine *Anates*, by means of a group of which *Anas arborea*†, Linn. is the representative. This third

* "Ils vivent dans les prairies et dans les marais, nagent peu, et ne plongent point." *Temminck, Man.* p. 816.—In addition to *Anser*, this first division contains *Cygnus*, Briss., together with *A. bernicla*, and its congeners.

† "D'autres espèces, (*A. arborea, viduata,* &c.)—— ont avec le bec des canards des jambes plus hautes mêmes que celles des oies; elles se perchent et nichent sur des arbres." *Cuv. Regne Anim.* i. p. 538.

and most typical group of the family, which accords with M. Temminck's first section of "*Canards proprement dits*," still approaches more closely to the land-birds than the birds which follow: the species swim with ease, and even dive, but the latter faculty they seldom exercise unless when pursued. Their food is also less exclusively marine than that of the succeeding groups, being composed of vegetables, grains, and insects, in addition to fish*. This division, consisting of many prominent forms, of which *A. arborea* before mentioned, *A. tadorna*, *boschas*, *clypeata*, *penelope*, and *querquedula* may be considered types, is distinguished from the remainder of the "*Canards proprement dits*" of M. Temminck, by the hind toe being entire, or free from the lobated membrane which is attached to the hind toe of these last. This character of the lobated membrane, which is of considerable importance as pointing out the approach of the birds in which it is found to the more typical oceanic families, prevails in all the remaining groups of the present family. It is strongly conspicuous in *Mergus*, Linn., the next division that appears to follow: and we consequently find that the species of that genus carry the powers of swimming and diving to the greatest extent, making use of their wings also in their progress through the water; and at the same time exhibiting a constrained and embarrassed mode of walking, in consequence of the backward position of the legs. It thus forms the passage to the succeeding family of *Colymbidæ*. In the shape of its bill, which is slender and partially compressed, it exhibits a distinct form in its own family: but still, by means of the bill of an intervening

* "*Les Canards* —— dont le pouce n'est point bordé d'une membrane, ont la tête plus mince, les pieds moins larges, le cou plus long, le bec plus egal, le corps moins epais; ils marchent mieux; recherchent les plantes aquatiques et leur graines, autant que les poissons et autres animaux." *Cuv. Regne Anim.* i. p. 536.—"Ceux se submergent rarement dans d'autres cas que lorsqu'ils sont poursuivis.—Leur nourriture se compose indistinctement de vegetaux, de graines ou d'insectes et de poissons." *Temm. Man.* p. 831-2.

species,

species, the *M. albellus*, Linn., which is intermediate in its breadth and depression, it preserves its connexion with the *Anates*. We hence pass to the fifth and last group of the family, which, with the bill of the *Anates*, retains most of the characters conspicuous in *Mergus*. The forms most prominent in it, represented by the different Linnean species *A. ferina*, *clangula*, *histrionica*, and *mollissima*, possess a strongly lobated hind toe*; they frequent the ocean for the most part, where they dive with the greatest facility and for a length of time; and they live chiefly on marine animals. Their legs are also thrown behind the equilibrium of their body; and thus also they evince their contiguity to the typical *Natatores*. By means of the group which contains *A. mollissima*, our well-known *Eider Duck* and its congeners, where the bill, with an elevated protuberance at the base, approaches that of the *Anas olor*, Linn., we find ourselves brought round to the *Cygnus* of the present day, which forms part of the first division. That genus in like manner deviates partially from the conterminous genus *Anser*, in its legs being thrown more backward, and its consequently greater awkwardness in walking. Here then the affinities are evident which thus establish the perfect return of the series of the *Anatidæ* into itself. Before we leave the family, I must indulge myself in observing a most conspicuous peculiarity which marks the series of affinities among these groups. The long and slender neck observable in the *Grallatores* is preserved in such groups of the *Anatidæ* as are most conterminous to that order, such as *Cygnus*,

* "Ceux —— qui ont au pouce un large rudiment lâche, plongent habituellement et long-tems: ces derniers vivent sur les grandes mers." *Temm. Man.* p. 831.—"Les espèces —— dont le pouce est bordé d'une membrane, ont la tête plus grosse, le cou plus court, les pieds plus en arrière, les ailes plus petites, les doigts plus longs, les palmures plus entières. Elles marchent plus mal, vivent plus exclusivement de poissons et d'insectes, et plongent plus souvent." *Cuv. Regne Anim.* i. p. 532.

Anser, *Bernicla*, and *Cereopsis*, until it is superseded by the short necks of the more oceanic *Anatidæ*, which exhibit all the expansion and capaciousness of throat observable in the typical *Natatores*.

The distinctively marked character of the lobated hind toe, which prevails among the latter groups of the family we have just quitted, conducts us to *Podiceps*, Lath., that commences the family of *Colymbidæ*, where the same character is strongly developed. The difference between the bills of the types of these two families is softened down by the intervention of that of *Mergus*, which is intermediate between the broad and depressed bill of *Anas* and the narrow and sharp-pointed bill of *Podiceps*. This last genus, in conjunction with *Colymbus*, Linn., from which it differs chiefly in the construction of the foot, composes the family of *Colymbidæ*. These two well-known groups, differing but little among themselves in external characters, form one of those normal groups of the order, where a deficiency is exhibited in the powers of flight by the shortness of their wings, and in the faculty of walking by the backward position of their legs. These deficiencies in the groups before us are compensated for by their capability of remaining for a length of time under water, and by their superior powers of diving. For this latter purpose the structure both of their wings and legs is admirably adapted: the former by their strength assisting them as oars under water, and by their brevity not interfering with their progress; the latter, by their compressed and sharpened edge offering no resistance to the water as they are drawn up to effect the stroke which accelerates the movements of the bird. From their superiority in these characters and powers, the birds themselves have obtained *par excellence* the name of *Divers*. In these particulars we may observe them to be united to the *Alcadæ* which succeed them, and from which they are chiefly separated by the presence of the hind toe, conspi-

conspicuous here, but deficient in the family to which we now proceed.

We enter the family of *Alcadæ* by means of the genus *Uria*, Briss., which, it may be remembered, was originally included in the *Colymbus* of Linnæus, and from which it has been separated chiefly on account of the tridactyle conformation of its foot. This character distinguishes the greater part of the present group, which, in addition to *Uria*, contains the genera *Alca* and *Aptenodytes* of Linnæus. The latter genus apparently carries to the extreme the typical character of those groups in which the wings becoming gradually shorter, and less furnished with feathers, lose at length all their powers of flight, and assume the functions of fins instead of wings, to assist the bird in its progress through the water. The whole of the family before us, united by the form of the foot, is separated into generic groups by the different shape of the bill. And here a beautifully progressive series of affinities is apparent throughout the whole group. Beginning from the true *Aptenodytes*, we may observe that the bill of that genus is long, rather slender, and somewhat curved; while that of *Catarrhactes*, Briss., which succeeds, is shorter and more elevated at the ridge; thus leading the way to *Spheniscus*, Briss., where the sides are compressed, and the *culmen* elevated into a sharp edge. This structure approaches the form of the same member in the true *Alca*, in which the sides are still more strongly compressed, and the *culmen* more elevated. The *Fratercula*, Briss., the well-known *Puffin* of our rocky coasts, following *Alca*, exhibits the extreme of this singular construction: and there cannot be a more interesting subject of contemplation to him who may wish to witness the mode in which Nature harmonizes her groups, than the gradual change of form that unites the short and elevated bill of this last genus with the long and slender bill of *Aptenodytes*. A similar gradation

gradation of affinities between conterminous groups leads us back again to the point from whence we started. Some species of the Linnean *Alca*, which M. Temminck has united under the generic title of *Phaleris*, with bills less elevated at the *culmen*, and more tapering than that of *Fratercula*, lead us gradually to the *Mergulus* of Ray, the *little Auk* of our cabinets. This genus, strongly and distinctively separated both from *Alca* and *Uria*, in the former of which groups it has been placed by Linnæus, and in the latter by M. Temminck, may be considered as intermediate between them. It thus brings us to *Uria*, where the pointed and tapering bill, again discernible, reconducts us to *Aptenodytes*.

The groups that compose the last family are characterized by having no hind toe. Those of the family of *Pelecanidæ*, next in succession, and now before us, are distinguished by what is termed a syndactyle foot, the hind toe of the bird being directed to the front, and all the toes being united by a membrane. These two families, thus separated from each other, are however brought into contact by the *Aptenodytes* of the last family, which possesses a hind toe, but small and feeble in construction, in which it approaches the three-toed *Alcadæ;* while on the other hand it has this member directed to the front, but without a connecting membrane, by which means the four toes are similarly placed with those of the *Pelecanidæ*. The family now before us, corresponding with the "*Totipalmes*" of M. Cuvier, comprises the whole of the groups which formed the genera *Pelecanus*, *Phaeton*, and *Plotus*, of Linnæus. The first of these genera is divided into the following generic groups; *Phalacrocorax*, Briss., which seems to retain the nearest affinity to the birds of the last family in habits and appearance; *Onocrotalus*, Briss., the genus so familiar to us as including the *Pelican of the Wilderness; Sula*, Briss., which contains our *Gannet;* and *Tachypetes*, of M. Vieillot, the *Frigate*

Frigate Bird of our cabinets. The manners of this last bird I have discussed somewhat at large at the commencement of this inquiry, as well as the various particulars by which it deviates from the type of the *Natatores*, in conjunction with the greater portion of the present family. I shall not therefore dwell upon the subject any further than to mention its intimate and acknowledged connexion with the genus *Phaeton*, both in habits and general economy. In these particulars, as well as in the length of their wings and their extended powers of flight, these two groups evince a near alliance with the family of *Laridæ* which succeeds, and from which they can only be separated in consequence of their syndactyle foot. The genus *Plotus*, united by its bill to *Phaeton*, leads back to the earlier groups of the *Pelicanidæ*, with which, though it differs from them by the straightness of the bill, it agrees in manners and general organization.

The *Phaeton* of the last family bears a considerable resemblance in general appearance and habits to the *Sterna*, Linn. of that upon which we now enter. The before-mentioned construction of their foot alone effects a separation between them. Even here, however, we may observe the gradation that exists between the feet of the two families; the web that unites the toes of the *Tropic*, as well as of the *Frigate Bird*, is but half the size of that of the *Pelecanidæ* in general; and thus their foot preserves a connexion with that of the *Terns*, where the same membrane is equally contracted. We thus enter the family of *Laridæ*, by means of *Sterna*, with which *Rhynchops*, Linn. most intimately accords in habits and external characters, notwithstanding the dissimilitude of the bill. The *Sterna Anglica*, or *gull-billed Tern* of Col. Montague, conducts us from these genera to the groups which compose the Linnean *Larus*, now justly subdivided into two genera, the *Lestris*, Ill., and *Larus* of authors. From this group we are led to the genera *Diomedea*, Linn., and *Haladroma*, Ill., which are characterized

terized by the absence of the hind toe, by means of the species *Larus tridactylus*, Lath., where, though the hind toe is not absolutely deficient, as might be inferred from the specific name, there appears but the rudiment of one, or rather a stump without a nail. The last-mentioned genus *Halodroma* originally belonged to the *Procellaria*, Linn., and was separated from it by its tridactyle foot. Even in this character, however, it forms a passage from *Larus* to the groups that compose the genuine *Procellaria*, all of which are distinguished by the singular peculiarity of having no true hind toe, but a nail adhering to the *tarsus* in its place. We thus arrive at the *Petrels*, separated into the groups of the *Procellaria*, Auct., *Pachyptila*, Ill., *Puffinus*, Ray, and the section denominated by M. Temminck "*Les Petrels Hirondelles.*" These two latter groups appear to lead us back to the *Terns*, or *Sea Swallows*, from whence we started. The whole of this family, which corresponds with the "*Longipennes*" of M. Cuvier, is distinctly characterized by the strength and expansiveness of their wings, with the aid of which they traverse immeasurable tracts of the ocean in search of their food, and support their flight at considerable distances from land, seldom having recourse to their powers of swimming. We may thus discern the gradual succession by which the characters peculiar to the order descend from the typical groups that swim and dive well and frequently, but make little use of their wings for flight, to the present groups, which are accustomed to fly much, but seldom employ their powers of swimming, and never dive*. The family of *Laridæ* may thus be observed to stand at the very extremity of the order, and it assumes, as I have already observed, in conjunction with the

* "Le plus grand nombre des espèces qui composent les premiers genres de cet ordre (sc. *Sterna, Larus, Procellaria*), se reposent sur la surface de la mer, volent le plus souvent, ne nagent point habituellement, et ne plongent jamais." *Temm. Man.* p. 730.

other

other extreme groups, much of the habits of the land birds. A portion of the group before us, the *Petrels*, seem even to employ their feet in their own element as if on land, walking, as it were, on the surface of the waters *. We have thus arrived at the termination of the last family of the order, and have to look for its connexion with the first. This link is immediately supplied by the before-mentioned genus *Pachyptila*, in which the bill, broad and depressed at the base, assumes the character of that of the *Anatidæ*†. There is indeed a considerable approximation and interchange of character between the two groups. The bill of some species of *Anser* may be observed to become gradually less broad and more compressed, so as to bring them closely to the *Petrels;* while again the web that connects their toes is equally curtailed in extent, until in one species, the *Semipalmated Goose* of Dr. Latham, figured in the Supplement to his "*Synopsis*," we may observe no greater web than may be seen among many of the *Sternæ*. On the other hand, the same membrane is so extended in some of the *Petrels* ‡, as to equal the most dilated web observable among the *Anates*. We may also add that the divisions of the *Procellariæ*, as they approach the *Anatidæ*, become gradually more nocturnal in their habits, and thus adopt a character common to a great portion of the latter family §. Here then in

* " Celui (sc. le nom) de *Pétrel, Petit Pierre,* leur vient de l'habitude de marcher sur l'eau en s'aidant de leurs ailes." *Cuv. Regne Anim.* i. p. 515. " Dans leur vol, ils semblent effleurer les vagues de la mer, mais ils se posent très rarement sur la surface de cet élément, qu'ils semblent redouter, puisqu'on ne les voit jamais nager, bien moins se submerger; ils semblent piétonner sur la surface des eaux, mais toujours tenant les ailes droites et en l'air." *Temm. Man.* p. 801.

† " Les *Prions* (*Pachyptila,* Ill.), qui, semblables d'ailleurs aux *Pétrels,* auraient les narines séparées comme les *Puffins,* le bec élargi à sa base, et ses bords garnis extérieurement de lames comme les *Canards.*" *Cuv. Regne Anim.* i. p. 517.

‡ As in *P. capensis,* Linn.

§ " Tout le genre (sc. *Procellaria*) est composé d'oiseaux plus ou moins demi-

 nocturnes,

in the fifth and last order of birds we perceive the families of which it is composed following each other in a regular series of affinities, which returns into itself with a continuity similar to that which has been equally apparent in every other great department of the class.

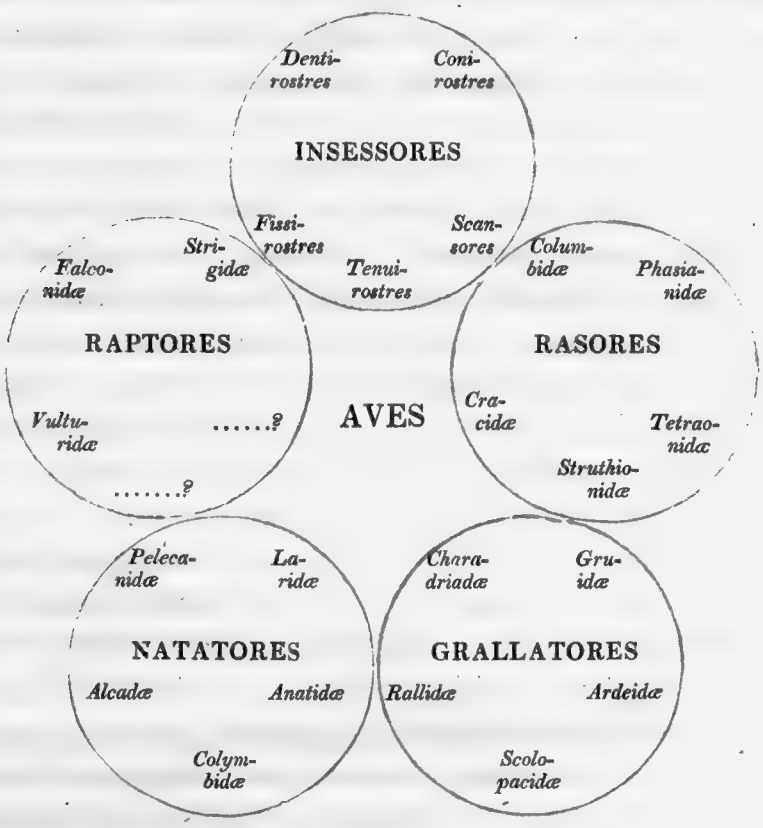
It now only remains for me to sum up the conclusions that may be drawn from the foregoing observations, and to exhibit in as short a compass as possible the affinities to which I have called so much of the attention of this Society, as connecting the Orders of Birds together and also their Families. For this purpose I beg leave to lay before them the following Table of Affinities, which shows at one view the circular succession in which the various groups of the class are united. The divisions which compose the typical order of *Insessores* will be recognised as more comprehensive than those into which the other orders have been resolved, and as forming tribes instead of families. A reference therefore will be necessary to the former table *, which being constructed on similar principles, I subjoined to my observations on that order, for the purpose of completing our information with respect to the regular succession of the families of the class. I shall not here enter into any remarks upon the analogies that may be

nocturnes, qui chassent et pourvoient à leur subsistance au crépuscule et à l'aurore, surtout pendant les nuits éclairées des régions boréales.——Ils (les *Pétrels proprement dits*) sont plus diurnes que les suivans.——Les *Pétrels puffins* sont, de même que les *Petrels hirondelles*, oiseaux nocturnes qui chassent au crépuscule, et se cachent le jour dans les trous des rochers ou dans les tanniers de lapins et des rats, et ne sortent de ces retraites souterraines qu'au crépuscule, ——." *Temm. Man.* p. 801-2—4. "On the face of this expanse of waters, and perfectly secure from fowlers, lie all day long, in the winter season, vast flocks of ducks, teals and wigeons, of various denominations; where they preen, and solace, and rest themselves, till towards sunset, when they issue forth in little parties (for in their natural state they are all birds of the night), to feed in the brooks and meadows; returning again with the dawn of the morning." *White, Nat. Hist. of Selborne*, p. 24. ed. 1813.

* P. 468.

observed

observed to prevail between the parallel or corresponding groups in the table before us. The investigation of such points would lead to a discussion which would far exceed the limits proposed in this brief inquiry. I have already entered into some explanation of the principles that regulate such relations of analogy, when investigating the order of *Insessores;* and the application of the same principles to the present table will afford much interest, and suggest many important inferences, to those who are familiar with the groups of ornithology.



N. B. By an oversight of the printer's, the circles in the diagram at page 468 were not made to touch each other, as in the diagram above; and they thus seem to convey an erroneous idea of the series of affinity being incontinuous.

Having now completed the original design which I sketched out for myself at the commencement of this inquiry, I hope I may be allowed to affirm without laying myself open to the charge of presumption, that I have redeemed the pledge which I offered when I ventured to assert the uniform succession of affinities throughout the various feathered tribes. I feel at least some confidence, that, however my readers may differ from me as to the general views with which, for the sake of convenience, I have arranged my subject, however dissatisfied they may be with the details through which I have pursued it, they will acknowledge the two chief points which alone I esteem as of essential consequence,—the general prevalence of natural affinities between the orders and between the families of the class, and the circular succession in which, whether we view them in more or less comprehensive departments, they are connected together. One or two chasms have confessedly occurred to interrupt the progression of these affinities, and the continuity of these groups: and a considerable variation has been acknowledged in the strength and intimacy of the affinities themselves. Some affinities have been observed to unite the neighbouring groups so intimately, as scarcely to admit of any intervention beyond that of a species between them; while others have evinced an approximation only, more or less close, between these groups, which will admit of many intervening forms before the connexion is perfected. But were the case otherwise,—were I to conceive myself enabled to produce a series that admitted of no chasms,—my knowledge of the present imperfect state of the science, the very conviction which has been forced upon me during the progress of the pleasing task of unravelling the intricacies of the subject before us, would give rise to a suspicion in my own mind, that my perfectly continuous series was rather the result of my own fancy, than a delineation of the actual state

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of things in nature. The very perfection of my plan would in that case be of itself the most formidable obstacle to my conviction of its truth and justness. Still, however, sufficient grounds have been shown, I trust, to prove the general prevalence of the principle which it is my wish to establish: and when we see it carried to so considerable an extent; when we find nothing to contradict it either in the groups which we already know, or in the species which are every day pouring in upon us—we may infer from analogy, I take it for granted, that the principle itself is universal; and that the deficiencies observable in our series are the result merely of our limited knowledge, and such as we may expect to see remedied as our acquaintance with nature becomes more extended.

How far the details that have been entered into in the foregoing view of my subject are correct, it is not for me to determine. I myself can detect many alterations that might take place, and many modifications that might be effected, without interfering with the general object of this investigation, or impugning the principles which it has been my wish to illustrate. Many of the different groups, for instance, might be enlarged at their extremes by important additions from the conterminous subdivisions, or might on the other hand be contracted by the transfer of a portion of their own extremes to the groups which adjoin them. Intervening assemblages might in like manner be formed out of the extremes on each side, and be separated from both, forming distinct and osculant orders or families between them, according to their extent and importance. Where there are no absolute divisions except species in nature,—and this from every observation I have been enabled to make I firmly believe to be the case,—every division which we are forced to institute in our arrangements for the convenience of illustration, and indeed for the purpose of mutual communication with those who

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are engaged in similar researches with ourselves, must be to a certain extent arbitrary and artificial. And every inquirer into nature may cause the line of demarcation, that separates his conterminous groups, to infringe more or less on the limits of either, according to his peculiar mode of viewing his subject. But concerning these more minute distinctions I have felt little solicitous. My chief object has been to seize upon the prominent features of nature; to fix my attention, as it were, upon the grand elevations and projecting outlines of the prospect that lay before me; to select in short the typical eminences that pointed out most distinctively the natural bearings of my subject. In this research, while it was one of my chief objects to ascertain the gradations by which my groups, distinguished from each other at their typical heights, were connected together at their base, I have considered it a matter of minor importance to determine the exact limits by which they may be supposed to be separated.

In a pursuit of this kind, and conducted by such views, the only earnest we can possess of having in any degree attained our object is a strict and exclusive adherence to the laws and dictates of nature. During the progress of the researches which have been necessary for the purposes of this inquiry, such an adherence therefore has been the criterion by which I estimated the value of every inference that I was induced to draw, and every principle that I ventured to inculcate. I have investigated each group with reference alone to its place in nature, to its habits and general economy. External character has been but of secondary moment as producing division, and essential only as it appeared subservient to the before-mentioned paramount principles; that is, as far as it decidedly indicated some natural affinity, or an adaptation to some natural purpose. In the progress of such inquiries much important information has of course been afforded me by the observations of those who have preceded me

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on this subject, and many copious draughts have been taken from these valuable sources. But, while I have given due credit to every inference which my predecessors have been enabled to deduce from their own observations, and every affinity which their own judgement and experience have enabled them to point out, I have carefully abstained from adopting implicitly the systematic notions of any individual, or restricting myself to any particular line or mode of arrangement. Devoted to no school of natural science, and carried away by the dictates of no authority however high, no reputation however imposing, I have come to the investigation of my subject,—and I trust I may here be allowed to know myself,—unseduced by the fascinations of theory, and unfettered by the trammels of system. Whatever has appeared to me most conspicuous by its own merits, and most conformable to the truth of nature, I have unhesitatingly extracted from every source, in whatever school or country it may have been promulgated, or by whatever systematic views or scientific arguments it may have been supported. Considerable has been the aid for which I am thus indebted to the labours of my predecessors. Besides the valuable information which I have gleaned from the works of the earlier systematic ornithologists, our own Ray in particular and M. Brisson, much obligation is due on my part* to the clear, cautious, and discerning acumen of M. Illiger;—much to the commanding views and generalising mind of M. Cuvier;—much to that scientific sagacity and those enlarged and penetrating powers of investigation, which have placed M. Vieillot in the highest rank of philosophical inquirers into nature;—and

* I speak here only of professed systematic ornithologists. Were I to enumerate my obligations to all whose public writings or whose personal friendship have partially contributed to my information, I should be involved in an endless return of gratitude and acknowledgement.

much

much to that accuracy of observation and unwearied diligence of research, which have deservedly entitled M. Temminck to the reputation of being the first practical ornithologist of our days.

But there is a name still higher than all,—and as a member of this Society, I feel that I may indulge myself in referring to it with almost filial reverence—*Clarum et venerabile nomen!* to which the debt due by every lover of ornithology should be repaid by something more than bare acknowledgement. Whoever can form a just estimate of the important benefit that is conferred on every branch of Natural History by a comprehensive and luminous arrangement of its grand and primary subdivisions, and a perspicuous exposition of the leading affinities by which neighbouring groups are connected, will pay this just tribute of gratitude to the transcendent genius of LINNÆUS. It is true that a disposition has latterly prevailed to underrate the reputation of that great name, and the more specious pretensions of later ornithologists have partially thrown his merits into the shade. And this undeserved detraction has been increased if not occasioned by that fatality which ever awaits eminence of all description. For it has been his fate, in common with every exalted character who may be considered the founder of a school in science or philosophy, to have suffered more by the injudicious zeal and overweening partiality of his professed supporters, than from the undisguised attacks of those who would raise themselves upon his subversion. The former, regardless of the state of this department of nature at the period when he undertook to arrange it, and forgetting that the first efforts even of his great mind in reducing his subject into order were necessarily but the rudiments of the science;—mistaking, in fact, the foundation of his system for its perfect consummation, and thus making the grasp of the infant Hercules the measure of the powers of his manhood;—these his injudicious supporters, I repeat, adhering solely

solely to the letter of his works, but unmindful of their spirit, have palmed upon him a confined and restrictive code of arrangement, as foreign from the enlarged views of his own enlightened mind, as from the disposition of that Nature of which he was so faithful an interpreter. What was intended to have been applied to her works on a general and expanded scale, they would apply upon the minutest: they would make that system which they wish to uphold, an universal and unalterable standard for the adjudication of every object that may be referred to it, however great or however contracted may be its dimensions. They would preserve this system, in short, as it came from their master's hands, unenlarged and undiminished; admitting no increase to suit the increasing knowledge of the times, no modification to embrace the accumulating modifications of Nature. It is not therefore to be wondered at, that the adversaries of this great man should have rejected *in toto* a system, which either their interest or inclination did not permit them to investigate, much less treat with justice, and which, thus modelled to their hands, they found unsuited to any practical purpose.

But to arrive at a just knowledge of the question before us, we must judge from the merits of the case itself, and not from the partial views of either friends or opponents. It is to be remembered that there are three great stages in the progress of natural science, after it has assumed somewhat of a definite form, which are marked by decisive limits. The first is confined to the investigation of the more extensive affinities that prevail among the scattered productions of nature, and to the arrangement of them according to these leading affinities. The second takes place at that period when the materials of the naturalist become too far multiplied to admit of being classed in the more extended departments alone, and when his business is rather the investigation of differences than of affinities, and the subdivision of groups

rather than their combination. The third and more perfect stage is when the advantages of both these methods are embraced, when both the affinities and the differences of natural objects are so far consulted, and the synthetic and analytic modes of arrangement so far combined, as to give a view of Nature with reference as well to her greater as her minuter divisions, and to dispose her productions according to their grander proportions as well as in detail. It is evident that a vast accumulation of materials must be laid before the man of science, before he can venture upon this last and most finished mode of investigation; and that even at the present moment, although he may make the attempt, he can give no more than a faint and powerless outline of the face of nature, abrupt in some points, and a total blank in others. It must be equally evident to those who are aware of the truly infant state of the science when Linnæus undertook the revision of the groups of Ornithology, that he could have advanced no further than the first of the above stages in his attempt, and could have had no object at the time beyond the investigation of the affinities which unite the larger groups. And here lies his great and transcendent merit.—I speak of course only of his exertions in Zoology, and in that branch of it still more particularly to which our attention is at present confined.—And in this point of view it might afford us matter for astonishment, were we not acquainted with the matchless powers of his mind, to observe, that, notwithstanding his limited acquaintance with species, his mode of arranging Nature's grand outlines is more enlarged in its views, and more conformable to the affinities of her groups, than that of any of his successors, in despite of all the advantages with which time, and the new lights that are every day thrown upon science, have enriched them. In fact, although the productions of at least one fifth part of the world were almost entirely unknown to him,—and those, it may be remembered, embracing

bracing more than their due proportion of variety of forms,—although even at the present moment more than five times the number of species have been examined and described, beyond what could have come under his observation; yet such were the enlarged views of his exalted mind, that his principal divisions are still sufficiently extensive to embrace with some slight modification all the later acquisitions of science, and so conformable to our more advanced and accurate knowledge of nature, as to require little, if any alteration. These his great primary divisions, under whatever denomination we may receive them, whether, according to the great influx of materials that have latterly swelled out their limits to an almost disproportioned extent, we give them a more comprehensive title than that by which he designated them; whether, in short, they may be denominated Tribes, or Families, or Genera—the name signifies nothing,—will still form the justest foundation for all researches in Ornithology, and be a sort of tribunal to which every grander affinity and every leading character may be referred for decision. These primary divisions, it is almost unnecessary to add, have been my chief guide in the course of this inquiry. These I have studied with still increasing admiration, and have adopted with almost boundless confidence. And were it indeed necessary that I should subscribe to the views of an individual, or admit any other dictator in my pursuit of nature, than Nature herself, the authority to which I would bow, and the light that I would implicitly follow, should be the enlarged and philosophical mind of the immortal Swede.

XXIII. *Descriptions of two Species of Antelope from India. By Major-General Thomas Hardwicke, F.R.S. and L.S. &c.*

Read February 18, *and June* 17, 1823.

ANTILOPE.

Subgenus III. CERVICAPRÆ. *Desmar. Encyclop.*

**** Cornibus recurvatis.*

ANTILOPE GORAL.

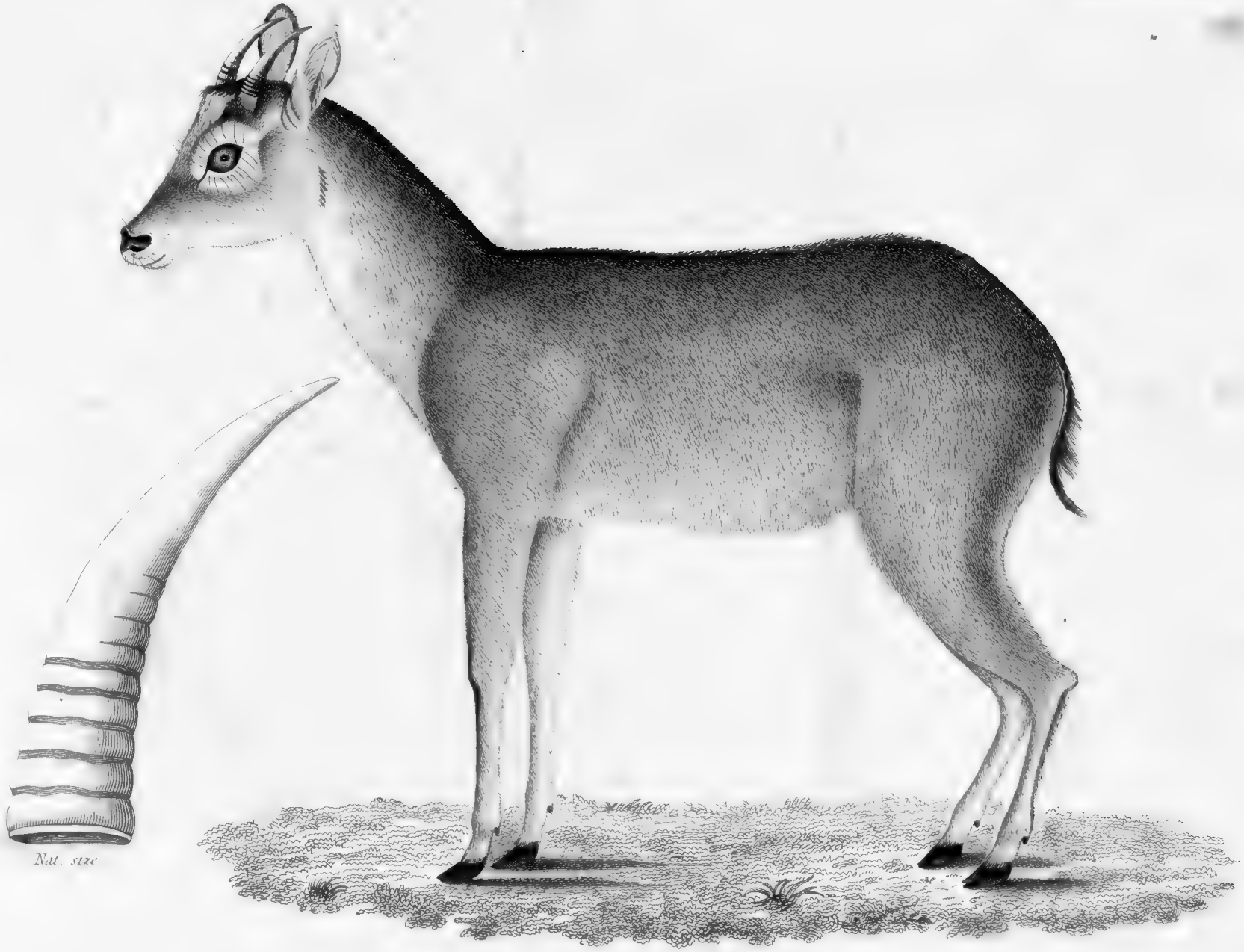
A. CORNIBUS brevibus approximatis recurvis subulatis basi annulatis ultra medium lævibus, corpore supra colore murino canescente subtus pallidiore, gula albente, cauda brevi attenuata subfloccosa, oculis sinubus lacrymalibus.

TAB. XIV.

This small Antelope is a native of the Himalayah range and the mountains of the Nepaul frontier; and by the natives of those regions it is called *Goral*.

Its size is about that of a common goat, of extraordinary agility, leaping to a great extent, and with great sureness of footing; very timid.

Head very conical, rather compressed, and tapering suddenly from the eyes to the snout, very wide across the cheeks, and narrowing towards the forehead. *Horns* black, short (4½ inches), subulate, approximating at the base, gently bending backwards, and slightly diverging towards their apex, smooth,



Nat. size

Antilope Goral.

I. Curtis sculp

smooth, excepting their base, which is marked with five or six gentle annular ridges, occupying about one-third of the whole length, gradually disappearing upwards. *Eyes* rather large, of a dark brown, surrounded with a circle of whitish hairs, and long, slender, black eyelashes. *Ears* large, five inches in length, ovate, erect; hair within white. *Neck* proportionably long. *Body* roundish; the back a little arched, which has the appearance of being higher at the rump, but is not so; it is the natural position of the animal, which seems as if always prepared to take a leap: from the rump to the tail much sloped. *Legs* slender, well formed; *hoofs* black. *Tail* slender, tapering, about four inches long.

The general colour is a grey mouse-colour (but almost white about the lower part of the neck and throat), and darker; with the hair longer along the upper part of the neck and back, inclining to ferruginous about the legs.

	Feet.	Inches.
The length of this animal from the top of the head to the root of the tail is	3	1
And in height from the foot to the back . . .	2	0
Length of the neck	0	$9\frac{1}{2}$
Length of the head	0	5
Girth of the body	2	2
Length of the fore legs from the elbow . . .	1	2
Circumference of the fore leg above the knee .	0	6
Ditto of hind leg above the joint . .	0	6
Ditto below the knee of both legs . .	0	3

The foregoing description is of the male. The female differs but little; has no horns, but in their place appear two prominent tubercles, covered with a tuft of dark-brown hairs.

Of

Of these animals, a male and female were presented by the Court of Kathmandre to the Resident, the Honourable Edward Gardner; and the male is living in the collection of animals in the Governor-general's menagerie at Barrackpore.

Its flesh is, in the estimation of those who have eaten of it, considered delicate venison.

I find, on conversing with an intelligent native from the Valley of Kathmandre, that the name of this animal is pronounced with a single *o*, and open; as in *over*, *go-cart*, &c.

It is considered by the natives of Nepaul as the most active of the Antelope species. It is seen in numerous herds, but is rarely taken, excepting by stratagem. If pursued, they disperse, and fly to precipices and places to which no dogs can follow them.

The subject from which the drawing and description was taken gave me proof of its agility in a space of about ten feet square, inclosed by stakes of eight or nine feet in height. These the animal attempted to spring over, and at every leap so nearly effected its purpose as to appear to a person looking on in imminent danger of being staked.

**** *Cornibus quatuor.*

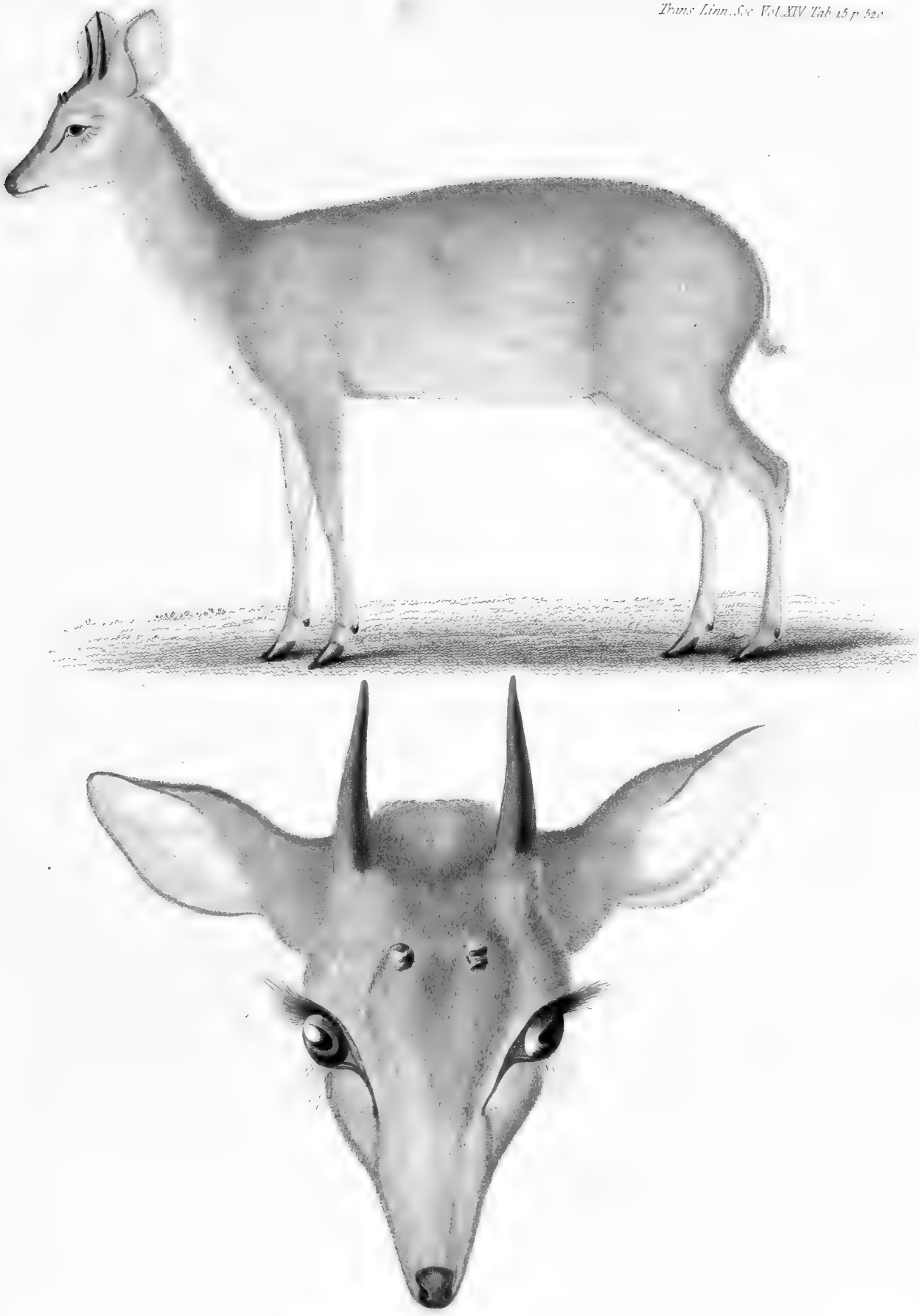
ANTILOPE CHICKARA.

A. cornibus quatuor, anterioribus erectis cylindricis brevibus abrupte acuminatis basi subapproximatis, posterioribus subelongatis subulatis lævigatis rectis paululum divergentibus.

TAB. XV. and XVI.

This species of Antelope seems hitherto to have escaped any particular description of the naturalist; and this circumstance is the more remarkable, as the animal is not scarce in India.

It



Antilope Chickara, mas.

The head represented of half the natural size.

J. Curtis sculp.

It inhabits the forests and hilly tracts along the western provinces of Bengal, Behar, and Orissa, and is known by the name of *Chikara*.

It is an extremely wild and agile creature, and only to be tamed when taken young.

In size this species is something less than the Harnessed Antelope (*A. Scripta*); it is in height, from the foot to the top of the shoulder, $20\frac{1}{2}$ inches; and in length, from the nose to the root of the tail, 33 inches, or 2 feet 9 inches; and the tail is $5\frac{1}{2}$ inches more.

The superior or common *horns* are black, subulate, rounded, without annulations, smooth, and erect, slightly inclined forward, and a little diverging; their length 3 inches; space between them, at the base, 1 inch $\frac{8}{10}$ths, and at their tips 2 inches $\frac{4}{10}$ths. The greatest thickness at the base is 2 inches in circumference, and gradually tapering to a point of $\frac{1}{10}$th of an inch diameter. In front of the common horns (1 inch $\frac{4}{10}$ths) in the middle of the forehead, and between the eyes, rises a very short pair of spurious horns, erect, stumpy, smooth, cylindrical, $\frac{3}{4}$ths of an inch in length, $1\frac{1}{2}$ inch in circumference at the base, and suddenly tapering to a point; they are apart at the base $\frac{3}{4}$ths of an inch, and at their tips 1 inch $\frac{2}{10}$ths.

Head in length $7\frac{1}{2}$ inches, and its greatest circumference across the cheeks and behind the spurious horns 13 inches. *Ears* mostly erect, ovate; the greatest breadth about $2\frac{1}{4}$ inches, and length $4\frac{3}{4}$ inches. *Nose* naked and black, the margin of the lips black. *Eyes* large, with strong bristly black eyelashes. *Limbs* delicately made, the shanks of the fore legs being $2\frac{1}{2}$ inches in circumference, and those of the hind 3 inches; the proper and spurious hoofs are black; the greatest circumference of the body 29 inches.

The

The *general colour* of the animal is an uniform bright bay on all the upper parts; and below, *i. e.* the chin, the under line of the neck, the abdomen, the inner sides of the thighs, and under the tail, are inclined to white, more or less mixed with sandy hairs.

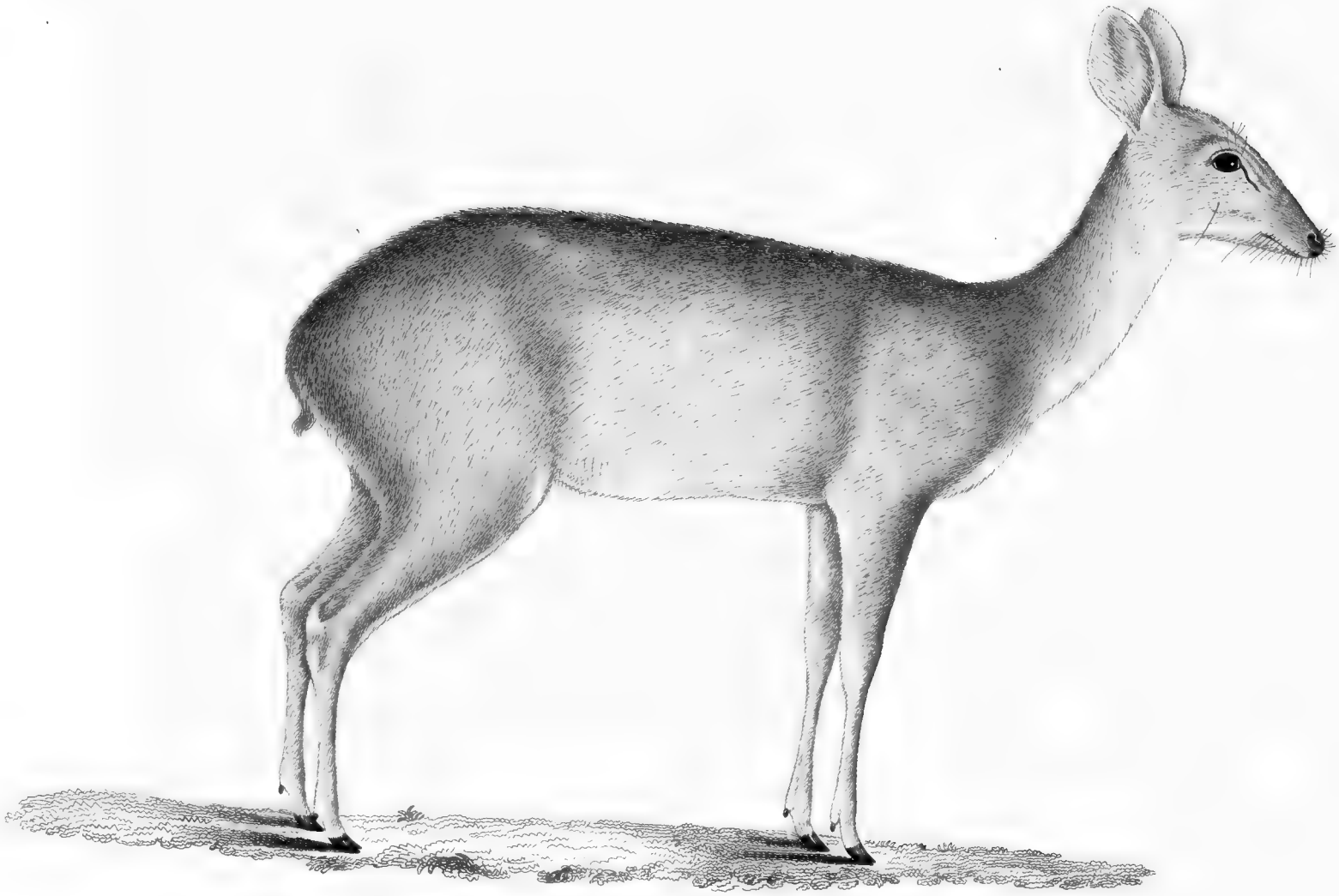
Teeth in the lower jaw eight in front, the two middle ones being greatly larger than the six lateral teeth, and spread out; their inner margins rounded, and not touching, and their internal surfaces hollowed like a spoon: in the hinder part of the jaw, on each side, are six strong grinders, with pointed surfaces, and a like number in the upper jaw similarly constructed.

This is the description of a male subject, TAB. XV. The female, TAB. XVI. differs only in having no horns, and being of lighter colours. This distinction of colour is found to be a permanent character; it at least remained so for the four years I kept a pair in my possession, and within which period they bred: two young ones were produced at the same birth, one a male, the other a female; and the distinction of colour as above was conspicuous at that early stage, and continued.

The male in the rutting season becomes exceedingly wild and mischievous, and, although partly domesticated, continues dangerously so, running at every animal within its reach, whether deer, goat, or man. Even the feeder could only approach him on the verge of the circle to which the rope he was tied with allowed him to reach.

The prepared head, which will accompany this paper, belonged to the subject under description. The spurious horns will be found blunted, the animal having worn off the points by his struggles occasionally to emancipate himself.

Note.



Antilope Chickara, fem.

J. Curtis sculp.

Note.—It is to be regretted that, owing to the accidental delay which has attended the printing of the foregoing paper, the respectable authors of the *Histoire Naturelle des Mammifères* have, in the 44th livraison of that very splendid work, published an imperfect description of the *Chickara*, or, as it is there printed, *Tchicara*, which is undoubtedly the *Antilope Chickara* above described.

In the work referred to it is stated that the largest or posterior horns are "grossièrement annelées à leur base;" whereas, by reference to the head in the Museum of this Society, it appears that Major-general Hardwicke is correct in stating that those horns are entirely smooth. The French description, and the figure which accompanies it, are stated to have been received from M. Devaucel; and there is reason to believe that both were taken from a drawing which that naturalist saw in Major-general Hardwicke's possession, and of which he solicited a copy when he visited the Major-general at the artillery cantonments at Dum-Dum in 1822. At that time M. Devaucel also saw both the male and the female alive in the possession of General Hardwicke; and the French description might afterwards have been partly made up from memory; for it is rather remarkable that M. Devaucel should have asked for a copy of the General's drawing, if he had actually the living animals in his own possession, as asserted in his communication to the authors of the French work. It is also remarkable, if M. Devaucel had such a good opportunity of giving a full description of the species, that the French authors should have occasion to regret the insufficiency of the notes which were transmitted to them with the drawing. M. Devaucel notices the name by which this animal is known in Nepaul; but in all General Hardwicke's inquiries, which were more extensive than M. Devaucel's could have been, he did not discover that the animal was found in Nepaul.

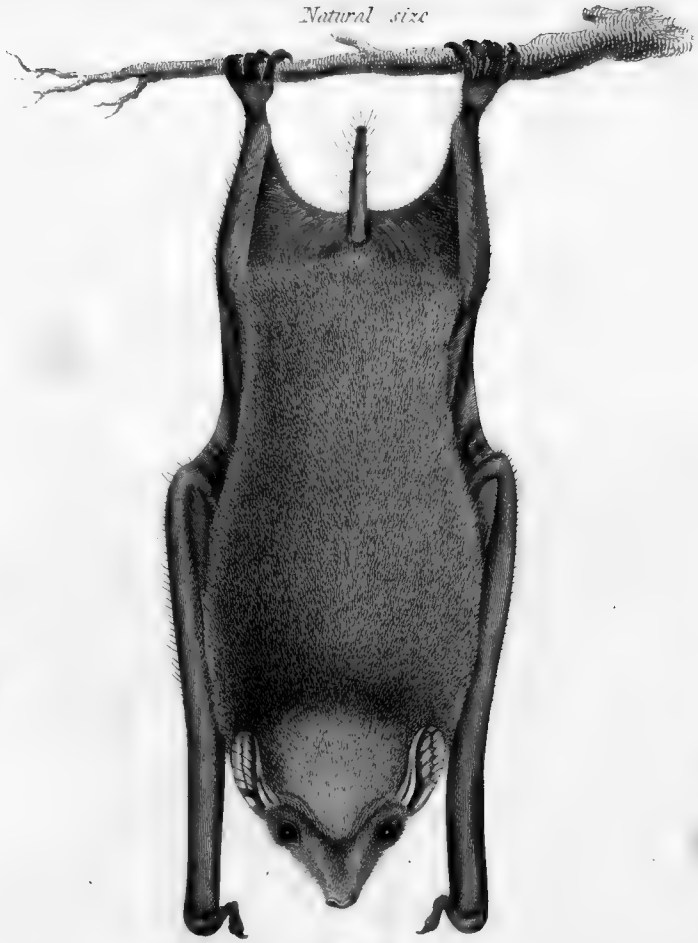
Major-general Hardwicke had originally described this species under the name of *A. quadricornis*; but M. Desmarest (*Encyclop.* "*Mammalogie*," 466.) having described a species under that name, from a skull in the Museum of the Royal College of Surgeons, which appears to differ from General Hardwicke's species in having the anterior or short horns triangular, it has been judged advisable to distinguish the species now described by the name of *A. Chickara*.

Dr. Leach has formed a new genus of the four-horned Antelopes under the name of *Tetracerus*.

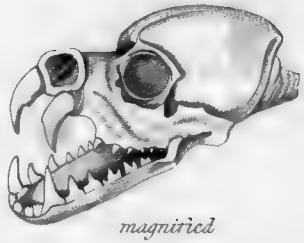
XXIV. *De-*

Trans. Linn. Soc. Vol. XIV. Tab. 17 p. 525.

Natural size



Nat: size



magnified

J. Curtis sculp

Taphozous longimanus.

XXIV. *Description of a new Species of Tailed Bat* (Taphosous *of Geoff.*) *found in Calcutta. By Major-general Hardwicke, F.R.S. and L.S. &c.*

Read March 18, 1823.

TAPHOSOUS LONGIMANUS.

T. SUPRA ex fusco rufescens, subtus pallidior, trago pedicello plano capitulo securiformi obliquo margine crenulato, brachiis digitisque elongatis.

TAB. XVII.

Head depressed, broad between the ears ($\frac{9}{10}$ths of an inch), suddenly tapering to the nose. *Nostrils* terminal, approximating, the margins tumid, the upper jaw longest. *Teeth:* in the upper jaw are two sharp, conical, slightly incurvated canine teeth; the space between them (the apex of the jaw) is naked, and a callosity supplies the place of cutting-teeth: on each side are 5 sharp-pointed grinders, the first very small, hardly appearing above the gums. In the lower jaw are two canine teeth, resembling those in the upper, but less curved, and between them, in front, are 4 minute incisores finely indented on their margins: on each side the canine teeth are 5 grinders, resembling those above, the two first single. *Ears* obliquely ovate, erect, transversely plaited inwardly; the plaits are very evident in the living animal, but more obscure after death. The anterior margins hairy

inwardly, the posterior lobe elongated to the chin; and the marginal fold protrudes towards the auditory passage, which is further defended by an erect oblong valve, broader upwards than below. *Eyes* of moderate size, black. *Tail* one inch in length, and half the length of the uniting membrane, hardly tapering: in flight it is sheathed by the extension of the membrane; but when hanging to a branch, in its usual position of repose, the membrane is drawn up and leaves the tail apparently naked, but which is in fact covered with the skin of the membrane. *Body* thickly covered with a very soft hair; in the adult it is of a snuff brown: the legs, wings, and membranes black; but the full-sized young Bats are of a deep black on all parts. *Toes* 5 on each foot, all divided to the base, and of equal length. Extent of wings 14½ inches, length 5 inches, weight 5 drams.

This Bat is common in Calcutta, in dark store-rooms; at night it frequents habitations, attracted by the light of the candles and numerous insects.

XXV. *Ana-*

XXV. *Anatomical Observations on the Natural Group of* Tunicata, *with the Description of three Species collected in Fox Channel during the late Northern Expedition. By William Sharp MacLeay, Esq., A.M. F.L.S. Communicated by the Zoological Club of the Linnean Society.*

Read June 15, 1824.

It is almost unnecessary to state to the Linnean Society, which has received so many acquisitions to its Museum and so many valuable communications for its Transactions, in consequence of the late Northern Expeditions, that almost all the gentlemen under the orders of Captain Parry, as well as this distinguished commander himself, earnestly occupied themselves during their dreary residence in the North in collecting objects of Natural History. One of these gentlemen, William Nelson Griffiths, Esq., has brought home from Winter Island one of the best collections of invertebrate marine animals that I have seen from those regions; and it is with a feeling of great satisfaction that I take this opportunity of publicly expressing my thanks to his brother, John Griffiths, Esq., in whose possession the collection now is, for most liberally allowing me not only to examine, but to dissect, such specimens as I might conceive to merit minute attention. Among these animals are three species of simple *Tunicata*, the anatomical description of which will, I hope, interest the Society, as this group of animals, although so low in the creation, has, in consequence of the late investigations of M. Cuvier, and particularly

larly those of M. Savigny, attracted a considerable portion of public attention.

Although it is a proposition now almost undisputed, that Zoology cannot be satisfactorily studied without comparative anatomy* being taken for its basis, perhaps it may not be amiss to cite as examples of the truth of this assertion the singular discoveries of Savigny on the compound *Tunicata*. The wonderful facts which this distinguished naturalist has recorded could never have been discovered by him had he confined his attention to external appearances. Disdaining to rest contented with the manufacture of names, he employed himself in the investigation and generalization of physiological facts; and his discovery of compound *Tunicata* I conceive to be such as may deservedly be placed at the side of that of the metamorphosis of Batrachian reptiles, or any other important physiological fact whatever. Dissection, indeed, must always be resorted to when we wish to understand the structure of the *Tunicata*, whether simple or compound; and the naturalist who contents himself with describing the external appearance of an *Ascidia* may remain even more ignorant of the nature of the inclosed animal, than that person is of *Mollusca* who knows no more of them than the shells they once inhabited. Hence it is that Cuvier says, "La forme exterieure des Ascidies etant sujette à beaucoup de variations, leur surface offrant peu de differences, leur couleur ne se conservant pas après la mort, et differant probablement pendant la vie selon l'age et les lieux ou elles ont pris leur croissance, il est malaisé de les distinguer surement quand on n'a pas recours à leur interieur." So well aware was Aristotle of this truth, that he has given us an anatomical account of such species of *Ascidiæ* as he was acquainted with, so detailed and so accurate as to puzzle his

* Something like the converse of this proposition is also true; namely, that no comparative anatomist is worthy of the name who is not also a zoologist.

commen-

commentators, and to lead some of them to believe that his description was in fault rather than their own knowledge of Natural History.

The *Tunicata* have always been interesting to me as an osculant group connecting the polype *Acrita* and acephalous *Mollusca*. That this situation, assigned to them in the *Horæ Entomologicæ*, is natural cannot now for a moment be doubted. Their relation to the testaceous *Mollusca* has been pointed out by Aristotle, Baster, Linnæus, Pallas, Cuvier, and Savigny. Their relation to the Polypes has likewise been shown by M. Savigny, when he demonstrated that the *Alcyonium ficus* of Linnæus (*Alcyonium pulmonarium* of Solander and Ellis) is nothing else than an aggregation of minute *Ascidiæ* combined in a common envelope.

It is rather curious, indeed, to remark, that the affinity of these animals to *Mollusca*, although so early noticed, is less striking* to modern naturalists than that affinity which they bear to Polypes, and which was only discovered the other day.

Savigny has distinguished the *Tunicata* by their having a soft test or covering consisting of an organized envelope, provided with two orifices, the one branchial, the other anal†. By one of these orifices the *Ascidia* imbibes the sea-water and introduces it into the branchial cavity; and every person in the habit of observing these singular animals knows that almost the only sign of life which they exhibit on being irritated is the spirting out of this water from the branchial cavity. But for a general account of the structure of that group of *Tunicata* which comprises the

* M. de Blainville, however, compares them particularly with the genus *Mya*. See *Dict. des Sciences Natur.* art. *Mollusque*, p. 363.

† If this character be correct, as there is every reason to believe it to be, the imperfectly known genus *Mammaria* will, if truly described by Müller, not belong to the group, although it has been placed here by M. Lamarck. There is great obscurity, however, hanging over this genus as well as *Bipapillaria*, which, upon the authority of some manuscript notes of Peron, is said to have rigid tentacula.

Tethya

Tethya of Aristotle, or *les Ascidiens* of Savigny, I cannot do better than cite the description given by the ancient philosopher, and mentioned above.

In his *Historia Animalium*, under the head of Testaceous Animals (*τὰ ὀστρακόδερμα*), he observes that "there are some, such as those called *Τήθυα*, which are so entirely surrounded by their test or envelope* as to have no part of their flesh exposed." So far this accurate and philosophically drawn character may apply to the whole of the *Tunicata:* but Aristotle afterwards proceeds to describe the *Tethya* in the following more definite terms. "But of all these animals (viz. *τὰ ὀστρακόδερμα*), those which are called *Tethya*† have the most remarkable nature: for with them alone is the body entirely concealed in the test. This test or envelope‡ (*τὸ ὄστρακον*) is between the texture of leather and shell, and may consequently be cut like a piece of tough hide. The animal adheres to the rocks by its test, and has two passages or orifices (*πόρους*), distant from each other, and so small as not to be easily visible. By means of these it imbibes and discharges the water.

"On opening one of these animals, the inside presents, in the first place, a membrane composed as it were of nervures§ (*ὑμένα νευρώδη*),

* *Ἔστι δ' ἃ ὅλα περιέχεται τῷ ὀστράκῳ καὶ οὐθὲν τῆς σαρκὸς ἔχει εἰς τὸ ἔξω γυμνὸν, οἷον τὰ καλούμενα τήθυα.*

† As Aristotle afterwards mentions the colours of such species of *Tethya* as he was acquainted with, it seems probable that his species were the *Ascidia microcosmus* Cuv. and *Ascidia papillosa* Linn.

‡ In the original, "*τὸ δ' ὄστρακόν ἐστι μεταξὺ δέρματος καὶ ὀστράκου.*" This passage is curious, as showing Aristotle's disposition to generalize; a disposition so rare among modern comparative anatomists, that we need not be surprised at observing some of them to be perfectly ignorant of Natural History.

§ This is a good description of the beautifully reticulated membrane which forms the branchiæ of the *Tethya*, and will be easily understood on referring to the dissection of *Dendrodoa glandaria*, as given Pl. XX. fig. 5. Aristotle appears, however, by some mistake to have considered the branchial pouch as *surrounding* the intestine.

νευρώδη), and communicating with a fleshy intestine (τὸ σαρκῶδες); so that the intestine of the *Tethyon* appears contained in this reticulated membrane. Although, indeed, the flesh is alike in all testaceous animals, this intestine resembles in form that of none of them. It is suspended at two places, viz. to the above-mentioned membrane, and to the muscle* which proceeds from the side; and wherever it adheres to either of these it is narrowest. At each point of suspension this intestine tends towards those orifices which lead to the outside of the test, and by which it receives and discharges its food and water; so that if one of these apertures be the animal's mouth, the other must be its anus. One of these orificial processes is thicker† than the other. Within the cavity also of one or other of them there is a certain small cohering substance which divides it."

These preliminary remarks, and particularly this accurate though ancient description of an *Ascidia*, will be sufficient to enable any person to pursue the tenour of the following descriptions: but in order to understand them thoroughly, I need scarcely say that a perusal of the admirable memoirs of Cuvier and Savigny is indispensable.

The Tunicata‡, then, are animals which connect the *Acrita* or lowest primary division of the animal kingdom with the *Mollusca*. From the *Mollusca*, however, they differ in having an external covering consisting of an envelope distinctly organized and provided with two apertures, of which one is branchial, the other anal. They also differ from the *Mollusca* as well in their mantle

* Literally it is "to the skin from the side;" and in fact the suspending muscle is exceedingly like a piece of the tunic.

† This is the branchial orifice; and I suspect that the small cohering or continuous substance which Aristotle alludes to immediately afterwards, is the valvule of the anal orifice.

‡ According to his usual practice of changing names,—a practice which interferes so much with his well-merited reputation,—M. de Blainville calls this group *Heterobranchiata*, a name without one single quality to recommend it.

forming an internal tunic corresponding to the outer covering or test, and provided like it with two openings, as in having branchiæ which occupy all, or at least part of the membranaceous cavity formed by the internal sides of the mantle. From the *Acrita* they differ in having distinct nervous and generative systems, while their intestinal canal is provided with two openings both internal.

This osculant group may be divided as follows:

TUNICATA.

Aberrant group?	*Families.*	*Animals.*	*Generic Types.*
1. TETHYA. Or such *Tunicata* as have their mantle adhering to the envelope or test only at their orifices;—their branchiæ regular, constituting the sides of the respiratory cavity; and their branchial orifice surrounded by a membranaceous ring, which in general is supplied with tentacula, as in Polypes	1. ASCIDIDÆ*. *Tethyes simples* Sav.	Simple and fixed, having their orifices externally irregular	ASCIDIA.
	2. BOTRYLLIDÆ. *Teth. composées* Sav.	Compound and fixed, having their orifices externally regular	POLYCLINUM.
	3. LUCIDÆ. *Lucies* Sav.	Compound and floating, having their branchial cavity open at the two extremities.....	PYROSOMA.
Normal group?			
2. THALIDA. Or such *Tunicata* as have their mantle adhering every where to the envelope; their branchiæ irregular, consisting of two foliated processes attached to the sides of the thorax; and their branchial orifice merely provided with a valvule.....	4. BIPHORIDÆ.	Aggregated in their young state, and floating	SALPA.
	5. *******	.....	******

The

* De Blainville considers that the *Pyura Molinæ* makes the passage from the simple to the compound *Tethya*; that is, from the *Ascididæ* to the *Botryllidæ*. Savigny shows

The Tethya of Aristotle, or, as Pliny calls them, the *Tetheæ*, are in general incapable of locomotion; and the three species of which I now propose to explain the structure, seem all to have been dredged from the bottom of the Northern seas, where they lay fixed either to submarine rocks, sand, or sea-weed, or to other animals sedentary like themselves. These species all belong to the natural family of *Ascididæ*, which corresponds in every respect but name with M. Savigny's *Tethyes simples*.

Subgenus. BOLTENIA Sav.

External Character. *Body* with a coriaceous test, supported from the summit by a long pedicle, and having both orifices lateral and cleft into four rays.

Anatomical Character. *Branchial pouch* divided into longitudinal folds, surmounted by a circle of compound tentacula, and having the reticulation of its respiratory tissue simple. *Abdomen* lateral. *Ovary* multiple.

This generic character differs in some respects from that of M. Savigny, and is reformed, for anatomical reasons, which I shall hereafter explain at length in my description of the only species of the subgenus which I have seen from the late Expedition. It is the same species of Linnean *Ascidia* concerning which Captain Sabine says in the Appendix to Captain Parry's First Voyage, that it was not unfrequently taken by the trawl on the west coast of Davis's Strait, in lat. 70°. It is also, as this ardent lover

shows the affinity of these to *Pyrosoma*, and of *Pyrosoma* to *Salpa* or (as it is sometimes called, although the name is preoccupied in Botany) *Thalia*. De Blainville, indeed, goes so far as to call the *Lucidæ* "*Salpiens aggregés*"; and although no great stress ought to be laid on this author's arrangement, from his obvious wish to obliterate the inimitable labours of Savigny, it is clear that the affinity between *Pyrosoma* and *Salpa* is strong. A fifth group of the *Tunicata* is wanting to connect the *Biphoridæ* with the *Ascididæ*; and I have no doubt that such animals will soon occur to reward the industry of those who collect *Mollusca* and *Acrita*.

of science remarks, the *Ascidia clavata* of Otho Fabricius, but not that of Pallas, which now forms the type of Savigny's genus *Clavellina*. It is not, however, as Captain Sabine supposes, the *Ascidia globifera* of Lamarck, since the body of this species is subglobose and not sub-reniform, as in the animal described by Captain Sabine and by Otho Fabricius. The mistake has originated in the circumstance of Lamarck citing Bruguières's figure of his *A. pedunculata* as a synonym for his *A. globifera*. This, however, is no error of Lamarck; for the synonym is correct, but unfortunately, Bruguières's figure being a vile copy of a bad figure of Edwards, who has represented the branchial orifice of his *Animal-Planta* as somewhat simple and not quadrifid, as it ought to have been, Captain Sabine was induced to confide in the accuracy of Bruguières's figure rather than in that of Lamarck's synonym.

With respect to the *Ascidia pedunculata* I may observe, that not only Bruguières's figure of it in the *Encyclopédie Méthodique*, but also the one given by Shaw in the *Zoological Miscellany*, is a miserable copy of the above figure of Edwards's *Animal-Planta*, which is, as Dr. Shaw suspected, and as M. Savigny has shown, no other than the *Vorticella ovifera* of Linnæus. Dr. Shaw's figure of it is merely a reversed copy of Edwards's figure, retaining the same unnatural position and the same error, only more strongly marked, of the branchial orifice.

Having thus ascertained the identity of Lamarck's *Ascidia globifera* with *A. pedunculata* of Bruguières and Shaw, with the *Vorticella ovifera* of Linnæus, and the *Animal-Planta* of Edwards, nothing remains to be said on its nomenclature, except that it is the *Boltenia ovifera* of Savigny, who has most ably explained its anatomical structure.

It appears, therefore, that the animal now before me from Winter Island is not the true *globifera* of Lamarck, as may be ascertained on inspection of any of the above-mentioned figures.

Neither

Neither is it the *Ascidia pedunculata* of Lamarck, which is the *Ascidia clavata* of Shaw's *Zoological Miscellany*, the *Vorticella Bolteni* of Linnæus in the *Mantissa Plantarum*, and the *Boltenia fusiformis* of Savigny. This last animal, however, as Savigny suspected, comes much nearer than the *A. globifera* of Lamarck to the *Ascidia clavata* of Otho Fabricius, which, as I before said, is the *Ascidia globifera* of Captain Sabine, and one of the animals Mr. Griffiths has brought from Winter Island. It thus appears that considerable confusion has arisen in the application of the trivial names *pedunculata*, *clavata*, and *globifera*; and I shall therefore offer the following synopsis of the only three species of *Boltenia* which are yet satisfactorily known to exist, and which are all peculiar to the Arctic seas.

Spec. 1. Boltenia ovifera.

B. murina scabra vel potius hirsuta, corpore ovato, orificiis vix prominentibus, pedunculo sublaterali.

Boltenia ovifera. *Sav. Mem. vol.* i. *p.* 140. *tab.* 1. *fig.* 1.

Ascidia globifera. *Lamarck, Anim. sans Vert. vol.* iii. *p.* 127.

——— pedunculata. *Shaw, Zool. Miscell. vol.* vii. *tab.* 239. *Bruguières, Enc. Meth. no.* 12. *tab.* 63. *fig.* 12. 13.

Vorticella ovifera. *Linn. Syst. Nat. ed.* 13. *p.* 1319. 14.

Animal-Planta. *Edwards, tab.* 356.

Priapus pedunculo filiformi corpore ovato *Alex. Russel in Phil. Trans. vol.* lii. *p.* 556. *tab.* xvii. (figuris malis).

Animal aquatique. *Bigot de Morogues, in Mém. Etrang. de l'Acad. des Scien. de Paris, tom.* ii. *p.* 145. *cum tabulâ pessimâ?*

Spec. 2. Boltenia fusiformis.

B. obscure rufa vix scabra, corpore elongato-ovato, orificiis prominentibus, pedunculo terminali.

Boltenia fusiformis. *Sav. Mem. vol.* i. *p.* 141.

Ascidia pedunculata. *Lam. Anim. sans Vert. vol.* iii. *p.* 127.

Ascidia

Ascidia clavata. *Shaw, Zool. Miscell. vol.* v. *tab.* 154.
Vorticella Bolteni. *Linn Mantiss. Plant. app. p.* 552.
Zoophytorum genus novum. *Fred. Bolten, Epist. Hamb.* 1770. *cum tabulâ.*

Spec. 3. Boltenia reniformis.

B. obscura scabriuscula, corpore subreniformi, orificiis sub-prominentibus, pedunculo terminali.
Ascidia globifera. *Capt. Sabine in App. no.* x. *to Parry's Voyage to Melville Island.*
——— clavata. *Otho Fab. Faun. Groen. no.* 323. *Müller, Zool. Dan. Prod.* 2740. (secundum Fabricium, sed descriptio apud Müllerum nimis est indefinita et omnibus his speciebus idonea.)
Inhabits the northern seas of America.

Descr. *Envelope* sub-pellucid, whitish. *Mantle* or *tunic* very thin, provided with transverse circular narrow muscles, which cut each other very obliquely.
Tentacula about ten or twelve in number, very unequal, clavate, with the clava plumiform or beautifully divided into a number of regular laciniæ.
Branchial pouch marked with about fifteen or sixteen large folds, and having the net-work simple and regular as in the *Cynthia momus* of Savigny.
Dorsal sulcus having the two lateral filaments winged and the intermediate simple.
Œsophagus descending vertically to the lower end of the body, as suspended, and there meeting an ascending ovoidal stomach without any apparent internal folioli.
Intestine with an oblong longitudinal open loop, which is prolonged to the *pedicle*. *Rectum* narrow and sub-conical, and ascending nearly parallel to the œsophagus, only higher. *Anus* having a scolloped margin.

Liver

Liver coating the stomach behind the right ovary, and running from the lower end of the body, as suspended, about half way up. It is divided into several granulated lobes, some of which are separated from the others, particularly towards the pharynx.

Ovaries two, elongate, lobate, situated on each side of the body, and directed towards the anal orifice. *Right ovary* straight, claviform, lying close within the loop of the intestine. *Left ovary* larger and less lobate, but undulated and extending downwards behind the branchial vein.

The *body* of this singular animal is kidney-shaped, suspended to a cylindrical *pedicle*, very narrow and very long. Both the body and pedicle are scabrose, or covered with a rough surface, which is formed by exceedingly short coarse hairs. The original colour I cannot ascertain; but in spirits it is cinereous or dirty white, which may possibly be the true colour of the animal, as it is not unfrequently that of other *Ascidiæ*. The external *orifices* are placed both on the same side of the body; the *branchial* near the pedicle, and the *anal* near the opposite extremity, but both on the same line with the base of the pedicle: thereby differing from the *Boltenia oviformis* of Savigny, which has, as this naturalist says, the pedicle inserted, not precisely at the summit, but at its side. These orifices are cleft in a cross of four rays, and are not very prominent. The entrance of the branchial cavity is provided with a circular range of tentacula, which are composite, or divided at the extremity into a number of minute slips, or laciniæ of a regular form, which are attached to the edge of certain membranaceous folioles, into which the membrane forming the root as it were of the tentaculum, appears to branch.

The *dorsal sulcus* very nearly resembles that of *Ascidia momus*, as figured by Savigny, Plate vi. fig. 1., except that the lateral cordons are not transversely striated.

The

The *pharynx* is lower than the anal orifice, but is not, as in the *B. oviformis* of Savigny, at the lowest part of the cavity of the body; neither is the anus descending, as he represents it in that animal. The œsophagus descends, and conducts to a simple ascending stomach, provided with an ample liver, composed of many irregular lobes, the surface of which is minutely papillose or composed of rounded grains, which at first sight resemble ova. The larger lobes of the liver are attached to that part of the stomach which is nearest to the pylorus, *i.e.* highest. M. Savigny has denied the presence of a liver in his species of *Boltenia*, and has even made its absence to be one of the characters of the genus*! If he be correct in this observation, which a person who has had so many opportunities as I have had, to admire his consummate accuracy, can scarcely doubt, then there is a very important difference between his two species and mine; so important, indeed, as to render me most desirous of having an opportunity of examining the *B. oviformis* anatomically.—But to proceed with the details of *B. reniformis*: its long intestine mounts up as high as the base of the pedicle, and then descends nearly parallel to itself, and terminates in an ascending conical rectum and scolloped anus. There are two ovaries, unequal in size, but both placed longitudinally, so as to terminate near the anal orifice. The smaller ovarium is on the side of the intestines, fitting closely into the ascending loop formed by the stomach and intestine. It is clavate, rather straight, and formed, towards the extremity, of sub-cubical lobes, which contain the ova. The larger ovary is on the opposite side, between the mantle and branchial pouch: it is undulated, and not so lobated as the other. All

* In that part of the article *Mollusca*, in the Supplement to the *Encyclopædia Britannica*, which relates to these animals, and which, by the bye, is little more than a transcript of Savigny's admirable memoirs, we find the genus *Boltenia* characterized as having no liver.

these

these viscera are enveloped in a mantle, of which the summit is prolonged and fills the interior of the pedicle, as Savigny says, like a marrow. The muscles with which the mantle is supplied are very narrow circular fasciæ, crossing each other at very oblique angles, and may thus be easily distinguished from the nervures of the branchial net. The internal structure of *Boltenia reniformis* is, in short, so near that of *Cynthia momus* and *C. pantex*, that the generic difference which M. Savigny has stated to exist between them rests principally on their external structure, and the presence or absence of a pedicle.

It is easy for the naturalist now to perceive that those figures of *Boltenieæ*, which represent them as supported vertically on a rigid peduncle, give them an unnatural position; that is, a position where the branchial pouch, and consequently the œsophagus, instead of descending, ascend. The pedicle, indeed, is clearly flexible in a natural state, in order that its drooping by the weight of the body may give this last a position analogous to that of other *Ascididæ*. When such animals exist, supported by a rigid peduncle, this must be inserted at the other extremity of the body, as in the genus *Clavellina* of Savigny, the compound family of *Botryllidæ*, and perhaps the *Ascidia globularis* of Pallas and Lamarck. It seems necessary for the digestion of *Ascididæ*, if, at least, we may judge from their general construction, that the intestinal canal should form a loop or *ansa*. This loop, however, may be either ascending, as in *Boltenia*, or descending, as in *Clavellina;* the only circumstance common to both genera being, that the *loop* points towards the pedicle.

In the compound *Tunicata* of the family of *Botryllidæ* the pedicle seems to be a receptacle for the eggs, as in certain Cirripedes. In *Clavellina* it may possibly be the same; but whether it be also the case in *Boltenia* is not so certain.

The genus *Boltenia* evidently enjoys some degree of locomotion when its flexible pedicle is agitated to and fro by the waves; and it is not improbable that some points of its construction render this oscillation necessary to its comfortable existence: for we may observe, that one of those *Ascididæ* which come the nearest to it in structure (the *Cynthia momus* of Savigny) does not attach itself to rocks, but makes shift to float about in the Gulf of Suez by attaching itself to fuci and other submarine plants.

The second animal which I have to illustrate is sufficiently distinct from the former to allow me to form a new

Subgenus. CYSTINGIA.

External Character. *Body* with a sub-coriaceous test, affixed by the summit to a very short pedicle, which is in the same line with the two orifices. The *branchial orifice* quadrifid and lateral, the *anal* irregular and terminal; both being so little prominent as not to alter the form of the body.

Anatomical Character. *Branchial pouch* membranaceous, indistinctly reticulated, and divided into longitudinal folds. The *tentacula* of the branchial orifice composite. *Intestinal canal* lateral. *Stomach* very large, extending almost the whole length of the body. *Ovaries* two, composed of globular ova disposed in free racemes on each side of the body, with the branchial pouch and stomach between them.

This genus comes nearer to *Boltenia* than to any other hitherto described; and they may prove eventually to be only two subgenera,

genera, of which we want the intervening links to enable us to form an accurate notion of the genus to which they belong. At present, however, the characters, both internal and external, of the animal which I am about to describe, are so different from those given as generic by Savigny to *Boltenia*, that it is impossible to assign it to this group, which indeed has nothing in common with it, but externally a pedicle, and internally composite tentacula.

Pallas has in the *Nova Acta Petropolitana* described under the name of *Ascidia globularis* a species of this family, which he found during his Siberian journey plentiful on the shallow sandy shores of the Arctic Ocean; and as his description is very vague, and principally differs from that of the species before me in respect to size and the position of the apertures, it is just possible that the same animal may be intended; a circumstance which would be rather interesting in a geographical point of view. He describes it as being of the size of a large cherry, and fixed by a very short peduncle to the fine sand of those shores, the particles of which being agglutinated to its surface, make it appear rough.

If, however, both the apertures of the animal described by Pallas be truly terminal, and the peduncle be placed as represented in his figure, it is not only a different species from the following, but probably a very different genus.

Cystingia Griffithsii.

C. ovato-globosa cineracea glabra semipellucida, pedunculo vix longitudine corporis.

Tab. XIX.

Descr. *Envelope* semipellucid, yellowish. *Mantle* very thin, and provided near the branchial and anal orifices with a reticulation of circular muscles nearly at right angles to each other.

Tentacula about ten or twelve, compound and laciniated like those of the genus *Boltenia*.

Branchial pouch having its net-work exceedingly lax, meshes irregular and indistinct, but apparently simple, the nervures being nearly of the same size. The longitudinal folds of the branchiæ, or rather (owing to the singular position of them in this genus) their transverse folds, about fourteen or fifteen in number.

Length of body half an inch.

I have named this new species after the gentleman to whom I owe my acquaintance with its structure, and who appears to have found only this one specimen of it during the late voyage. And I shall now enter into the discussion of its anatomy with as much detail as the possession of only one specimen will enable me to do.

The body of this animal, so different in many respects from all other *Tethyæ*, is pyriform, and attached to a pedicle so short as scarcely to curve down further than the branchial orifice. This pedicle is rather conical at its base, sub-cylindrical and apparently very weak at its extremity. From this apparent weakness and imperfect formation of the pedicle, in conjunction with the circumstance of one side of the conical part in the only specimen that I have seen being encrusted with sand, I suspect that the animal can scarcely be said to be suspended by its pedicle, but rather reposes on the conical part of it; by which means the folds of the branchial pouch will take a vertical and the stomach a horizontal position, and thus be more in correspondence with the ordinary position of the stomach in simple *Ascidiæ*, which is very rarely descending.

The envelope of *Cystingia Griffithsii* is exceedingly smooth, and so pellucid as to appear almost gelatinous. The original colour

colour I cannot ascertain; but if it be the same as that of the specimen in spirits, it is cinereous, rather yellowish. The external orifices have scabrous rims, are very minute and scarcely at all prominent. The branchial orifice is quadrifid, and placed exactly half-way down the side. The anal orifice is on the same line with it and the pedicle, but is placed opposite to this last, so as to be terminal, having its external surface apparently without rays; in both respects being totally different from the anal orifice of *Boltenia*.

The entrance of the branchial cavity is provided with a circular range of ten or twelve unequal tentacula, which are composite or divided into laciniæ at the extremity, which laciniæ are again so minutely divided as to be almost plumate. The branchial pouch has about fourteen folds, and its net-work is very indistinct and lax, the transverse nervures being perhaps the most visible, particularly towards the branchial orifice. The folds of the branchiæ are most easily seen on the inside of the branchial pouch.

The *pharynx* is situated rather higher than the branchial orifice; and the *œsophagus*, which is about half the length of the stomach, after ascending to the highest part of the branchial vein, descends, and gives rise to a simple but enormous stomach, having a longitudinal division, marked somewhat deeply, and which runs almost the whole length of the body in a line between the base of the pedicle and the anal orifice. The intestine is exceedingly short, and apparently descending in a line with the stomach; the rectum is cylindrical, and anus simple. Such, at least, is the description of the digestive apparatus of this animal, if we give the name of *pharynx* to that end of the intestinal canal which opens into the branchial cavity, and the name of *anus* to that end of it which is free; and there is no doubt that such a description makes it an animal totally different from *Boltenia*, and in fact

fact from all other species of *Tethya*, not only with respect to the singular form of the intestinal canal, but inasmuch as the branchial vein is thus placed, in relation to the pharynx, directly opposite to its position in all other animals of this group. I therefore am induced in some measure to suppose that there is a monstrous formation in the intestinal canal of the only specimen which I have had the means of examining; a supposition which must of course for the present throw doubt on any generic character which might be drawn from the above description of the intestinal canal. If, indeed, we could imagine that, were it not for some monstrosity of structure, the intestinal canal would communicate with the branchial cavity by that end which, from its being free, I have been obliged to consider the anus, then the whole of the internal organs of nutrition would have a situation analogous to that of those of *Boltenia*. For instance, there would then be a short œsophagus opening near the anal orifice of the envelope, an ascending stomach, a long curved intestine, and descending rectum, while the branchial vein and heart would take their usual situation in respect to the pharynx and stomach. We know, moreover, from those Memoirs of Savigny, to which I have in the course of this paper had so often occasion to refer, that the digestive organs of the *Tunicata* are subject to analogous derangements, of which he has figured two remarkable examples in *Cynthia momus* and *Phallusia turcica*. It appears, indeed, to be a consequence of the low rank of these animals in the scale of being, and of their simple organization, that the organs apparently most essential to their existence may undergo the greatest inversions without affecting their life; for the monstrous *Cynthia momus*, described by Savigny, as well as the *Cystingia*, now under consideration, had its ovaries full of eggs.

The *Cystingia Griffithsii* has no liver very distinct, unless a substance which appears to coat a very small part of the stomach

mach in a spiral form may so be considered. The stomach is internally simple, with very slight transverse striæ.

The heart is situated horizontally between the lower part of the tunic and the stomach. It is large, ovoidal, and appears to be composed of several lobes, and is indeed of a structure different from that of such *Ascididæ* as are known. There are four vertical openings to it, which are capable of being widely distended.

The *dorsal sulcus* is remarkably distinct, and proceeds from the immediate vicinity of the heart, or rather along the back of it, to that of the branchial orifice. It may be seen through the external envelope of the body, when this is viewed on the left side, and forms an arch enclosing a lesser and more pointed arch, which last appears to be nothing else than one of the folds of the branchial pouch. At the point where this last arch touches the dorsal sulcus there is in our specimen an orifice opening externally, and apparently communicating by a tube with a beautifully diaphanous longitudinal pouch, which contains nothing but two blackish nodules, one of which is longer than the other. The imperfection of the only specimen in my power to examine has prevented me from accurately ascertaining the nature and use of this organization, which appears to have nothing similar to it in any of the other *Tunicata* hitherto observed.

The third animal whose structure I have to explain belongs to the natural

Genus ASCIDIA Linn. *Cynthia* Sav.

External Character. *Body* sessile, with a coriaceous test, having both orifices quadrifid, or at least having the anal orifice very rarely transversely cleft.

Ana-

Anatomical Character. *Branchial pouch* divided into longitudinal folds, surmounted by a circle of compound or simple tentacula; the meshes of the respiratory apparatus destitute of papillæ. *Abdomen* lateral*.

SYNOPSIS OF THE SUBGENERA.

Normal group. 1. *Branchial pouch* with more than eight folds. *Tentacula* compound. *Liver* distinct....	1. Cynthia..... *Cynthies propres* Sav.	*Reticulation* of the branchial pouch continuous.
	2. Cæsira Sav.	*Reticulation* of the branchial pouch interrupted.
Aberrant group. 2. *Branchial pouch* with only eight folds. *Tentacula* simple. *Liver* none.....	3. Styela Sav.....	*Ovaries* several, one at least on each side of the body.
	4. Pandocia Sav.	*Ovary* unique, *i. e.* only the right one, which is comprised in the intestinal loop.
	5. Dendrodoa mihi	*Ovary* unique, *i. e.* only the left one, which is ramose or branched, and situated between the branchial pouch and mantle.

The *Tunicata* agree with their contiguous group the *Mollusca* in the remarkable variation that exists in their system of generation. Like every other solitary character that can possibly be adopted for the ground-work of a zoological system, the mode of generation ought to rise in importance only in inverse proportion to its degree of variation. In a group of animals, for instance, where it varies according to the species, it is evidently of less importance, as affording natural characters, than among those groups where it remains less subject to variation.

* M. de Blainville seems not to have sufficiently studied these animals: for after giving an erroneous character to the genus *Ascidia*, and confounding it with the genus *Phallusia* and *Clavellina*, he ends with acknowledging, that with respect to the species "*leur distinction est assez difficile.*" Art. '*Mollusque*,' *Dict. des Sciences Naturelles*. Dr. Fleming has, on the other hand, given a very good view of this natural group in the art. '*Mollusca*' of the Supplement to the *Encyclopædia Britannica*.

When

When the naturalist happens to consider that he ought always to obtain his group before he attempts to find its character, he is sure to perceive this truth; and it is on this very principle, indeed, that Savigny, with his usual discrimination, has proceeded in the above natural arrangement of the genus *Ascidia*, which I have done little more than borrow from him. To this naturalist, whose works I cannot too often recommend to the careful attention of zoologists as models for imitation and true examples of the method in which Natural History ought to be studied, I would willingly have dedicated the following subgenus; but his name happens to have been employed in other branches of the science. On account of its ramose ovarium, therefore, I shall name this

Subgenus, DENDRODOA.

External Character. *Body* subcylindrical, with both orifices exceedingly minute and situated on the apex.

Anatomical Character. *Branchial pouch* marked only with eight folds, and having the reticulation continuous. *Orifices* terminal. *Tentacula* simple. *Liver* none. *Ovary* unique, branched, situated between the mantle and the branchial pouch.

Dendrodoa glandaria.

D. glandiformis, tunicâ glabrâ sub-opacâ.

Tab. XX.

Descr. *Body* subcylindrical, with a rounded summit. *Envelope* whitish, subpellucid, coriaceous and smooth, having its base rough with agglutinated pebbles; internally it has a pearly lustre, and is thickest towards the base. *Orifices* so little prominent as to be scarcely perceptible without a lens: separate from each other, and opening with four indistinct rays. *Mantle* muscular, but of uniform substance.

Tentacula about twenty-six, simple, subulate, alternately long and short.

Anterior nervous tubercle with many spirals.

Branchial cavity occupying the whole length of the animal.

Pharynx situated at the bottom of the cavity of the body. *Œsophagus* descending, and turning short round near the cardia into a cylindrical horizontal stomach, which is striated externally, and occupies with the pylorus (which turns round and lies parallel to it) the whole of the bottom of the cavity. *Intestine* very long. *Rectum* ascending, almost vertical, terminated by an anus margined.

Ovary one, situated on the left side, between the branchial pouch and the tunic. It consists of a trifurcated, cylindrical stem, having at the base, on one side, a forked branch, on the other a simple one, all of the same thickness.

This is a very singular animal in outward appearance, as it presents to the simple view no external orifices, and is shaped very much like an acorn. It appears to have been attached to some small pebbles by its base, some of which remain agglutinated to it, and give it a wrinkled appearance below. The upper part of it is coriaceous, rather smooth and subpellucid; for on compressing the body between the finger, the three branches of the ovary are very distinct. The colour of our specimen in spirits is cinereous. The top of the cylindrical body is rather flat, but rounded off at the sides. On applying a very strong power, we observe, at least in the only specimen I have had the means of examining, four apertures. Two of these are so large as to be visible with the naked eye, but are not the branchial and anal orifices, which are exceedingly minute. The two false apertures form a triangle with the branchial orifice, the space between them being rugose. The first is a semicircular cleft, which I believe to be

be accidental, as it appears in no way connected with the internal organization, although on compressing the body the fluid contents of the inside issued from this aperture. The second false aperture does not appear more connected with the internal organization than the other, but is externally of rather a complex appearance. It consists of a circular cavity, of which one half is surrounded by a thin raised margin. On one side of the interior of this cavity we see a mamillated eminence supporting two more minute mamillæ. What the use of this apparent organization is I cannot imagine, as it is situated on the space between the rings of the tentacula and the branchiæ, and seems therefore accidental. The *branchial aperture* is surrounded by a raised margin, within which we indistinctly see the four rays. On opening the animal, however, and viewing the branchial orifice from the inside, we find these four rays which compose it very distinct. The tentacula are very simple filaments, unequal in size. The folds of the branchial pouch are very distinct, and in the interval between them run two longitudinal nervures connected by transverse threads, which are again connected by short longitudinal filaments, thus forming a simple respiratory net-work.

The organs of digestion have great affinity in external structure and position to those of *Cynthia pantex* of Savigny, except that the stomach and intestine are horizontal, and the anus simply margined.

The extraordinary characteristic, however, of the animal is the many-branched unique ovary which coats the tunic on the left side behind the branchiæ, and which, when first seen through the semipellucid external envelope, gave me an idea of its internal structure being very different from what it afterwards proved to be on accurate dissection. The truth is, that different as this species is in external appearance from all other *Ascidiæ*, internally it agrees with the *Pandociæ* in almost every essential respect but the ovary.

It appears, therefore, that this singular animal completes the natural circle of the genus *Ascidia* in the most beautiful manner. It agrees with the first subgenus *Cynthia* in the nature of its branchial reticulation, and of its digestive apparatus, as above said. But *Cynthia* has two ovaries, the right one contained in the intestinal loop, and the left one coating the tunic. The first of these, or the right ovary, is the only one possessed by *Pandocia*, and the left is the only one possessed by *Dendrodoa*. The distinction between the aberrant groups of *Ascidia* depends thus upon the nature of their system of generation, as that which exists between the two normal groups depends on their system of respiration.

EXPLANATION OF THE PLATES.

Tab. XVIII.

Fig. 1. *Boltenia reniformis*, seen on the right side, and of the natural size. The specimen is probably contracted by being in spirits, as the situation of the loop of the intestine is indicated by a corresponding elevation of the envelope.

P. Pedicle.
C. Branchial orifice of envelope.
A. Anal orifice of envelope.

Fig. 2. The body of *Boltenia reniformis* (magnified) having about one-half of the external envelope cut away, and the several parts on the right side being seen *in situ*. Here the right ovary is seen lying closely confined within the loop of the intestine, of which the conical ascending rectum and scolloped anus are very prominent. The œsophagus is hid by the lower extremity of the right ovary, and by the

Trans. Linn. Soc. Vol. XIV. Tab. XVIII. p. 550.

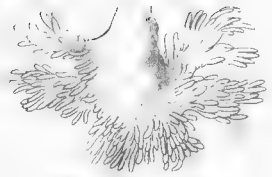


Fig. 5.

Fig. 4.

Fig. 2.

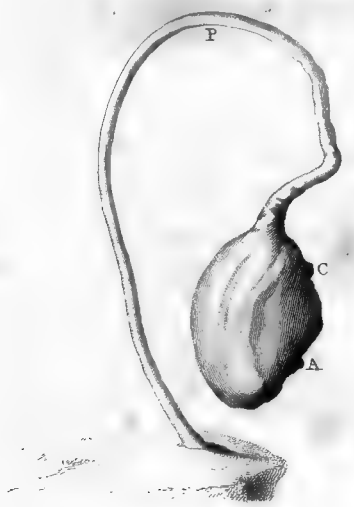


Fig. 1.

Fig. 3

W. S. Macleay del

Boltenia reniformis

I. Curtis & C. Fox sculp

the granulated liver, of which the curved commencement is seen opposite to a small mass of the left ovary, which, in cutting the envelope, has been left adhering to the mantle just under the anal orifice. The rest of the left ovary may be seen behind the ascending stomach, adhering to a fragment of the mantle, of which the muscular transverse fibres are very visible. Some of these fibres are also seen traversing the intestine and right ovary, keeping these parts as it were *in situ*. Between the intestine and the branchial orifice (which is marked on the inside by a circle of plumose tentacula) may be distinguished the folds of the reticulated branchial pouch. The anal orifice is internally somewhat elevated and quadrifid.

Fig. 3. *Boltenia reniformis* magnified, and the parts seen as in the former figure, except that the right ovary is separated from the intestine, and put aside with the stomach, so as to show the beautifully granulated lobes of the liver, which appear to be most voluminous towards the pylorus. The singular cubical lobes of the right ovary become also visible in this view of the several parts.

Fig. 4. Outline of *Boltenia reniformis* magnified as before. The intestine and right ovary being removed from their place, in order to show the position of the other parts more distinctly.

A. Anal orifice.

B. Branchial pouch.

C. Branchial orifice.

T. Circle of tentacular filaments, which surround in a pulpy irregular form the inner part of the branchial orifice.

D. Dorsal sulcus.

E. Frag-

E. Fragment of envelope.
K. Right ovary.
k. Left ovary.
O. Œsophagus entering into the branchial pouch, immediately behind which is the pharynx.
L. Liver coating the stomach.
I. Intestine.
R. Rectum.
H. Anus.

Fig. 5. One of the tentacular filaments of the branchial orifice highly magnified.

Tab. XIX.

Fig. 1. *Cystingia Griffithsii*, seen on the right side, and of the natural size. The translucid nature of the envelope permits us to see the position of the stomach, heart, and left ovary. The pedicle is encrusted at the base with minute grains of sand.

Fig. 2. *Cystingia Griffithsii* magnified, and seen on the left side. The transparency of the external envelope permits us to see the external arch of the dorsal sulcus, and the pointed internal arch touching the former at a point where there is a lateral orifice. Immediately below this we see the left ovary through the transparent envelope, and a little on one side is that dark-coloured nodule, which on dissection appears to be contained in a pouch.

C. Branchial orifice.
A. Anal orifice.
S. Grains of sand that externally encrust the thick end of the pedicle.

Fig. 3. Outline of the *Cystingia Griffithsii* much magnified, to show the various parts *in situ* on a portion of the right side of the envelope being removed.

A. Anal

Fig. 1.

Fig. 2.

Fig. 3.

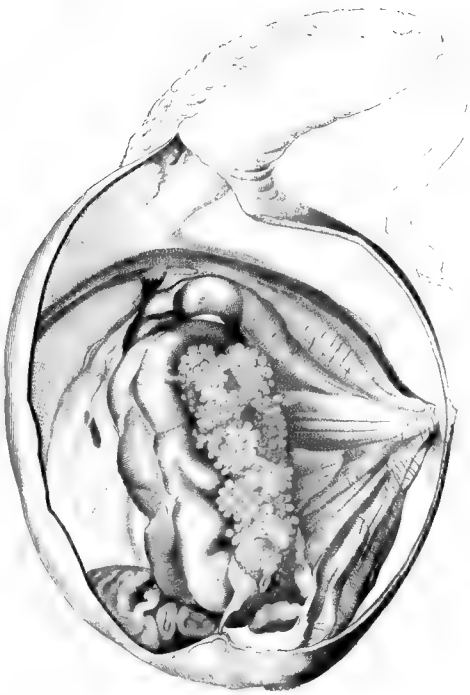


Fig. 4.

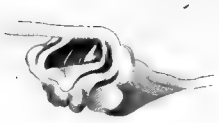


Fig. 5.

Fig. 6.

Cystingia Griffithsii

W. S. Macleay del.

J. Curtis &
C. Fox sculp.

A. Anal orifice.
C. Branchial orifice.
E. Envelope.
K. Right ovary, lying between stomach and branchial pouch.
d. Oviduct of same, opening towards anal orifice.
k. Left ovary, terminating upwards in a neck.
O. Œsophagus, or that extremity of the intestinal canal which communicates with the branchial pouch.
S. Stomach.
H. Anus.
V. Heart.
D. Dorsal sulcus.
o. Lateral orifice, communicating by a tube *t*, with a diaphanous pouch *p*, containing one or two blackish nodules *n*.

Fig. 4. *Cystingia Griffithsii* much magnified as before, but having the whole of the right side of the envelope removed, and the stomach thrown further back, in order to show the branchial pouch, which appears communicating by a narrow neck with the branchial orifice. The left ovary is hid by the enormous stomach, but in other respects the parts are nearly in the same situation as in the former figure.

Fig. 5. Heart of *Cystingia Griffithsii* (magnified), having the second of its four vertical apertures stretched open.

Fig. 6. The heart and other parts on the right side of *Cystingia Griffithsii* lifted up, to show the oviduct of the left ovary opening downwards to the anal orifice, round which we observe a net-work of muscular fibres reticulating on the mantle.

Tab. XX.

Fig. 1. *Dendrodoa glandaria* seen on the right side, and of the natural size. The base encrusted with pebbles has the appearance of the cup of an acorn.

Fig. 2. *Dendrodoa glandaria* seen obliquely, so as to show the top, which is a little compressed, and exhibits four points. The two lowest and largest are false orifices; the two smallest (which are indeed so small as to be almost invisible to the naked eye) are the real orifices, the highest being the anal and the other the branchial orifice.

Fig. 3. The two false apertures of *Dendrodoa glandaria*, much magnified, and forming a triangle with the branchial orifice.

C. Branchial orifice.

c'. False aperture, possibly accidental, and consisting of a circular cavity containing a mamillated eminence.

c. Aperture, supposed to be accidental.

Fig. 4. *Dendrodoa glandaria* of the natural size, but compressed between the fingers, so as to show on the left side the branched form of the only ovary.

Fig. 5. Highly magnified view of the interior of *Dendrodoa glandaria* when exposed by a vertical section of the envelope through part of the left side and the whole of the right. The top being thrown back, we perceive the internal appearance of the branchial orifice surrounded by its simple tentacula and communicating with the branchial pouch, of which sufficient has been left to show the nature and beauty of the net-work. Behind this net-work and adhering to the mantle we see the left ovary unique and ramose. The stomach striated with folds, and the intestine are seen lying parallel to each other at the lowest part

Fig. 1.

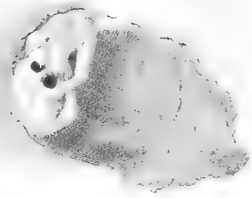


Fig. 2

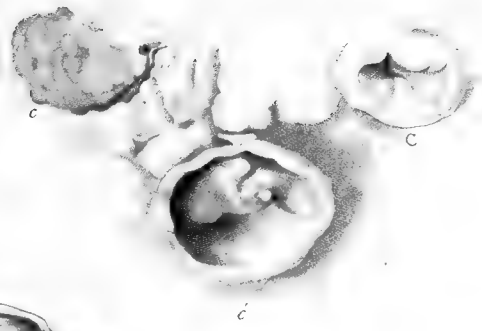


Fig. 3.

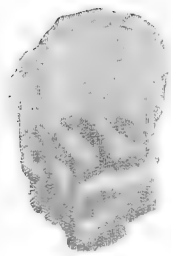


Fig. 4.

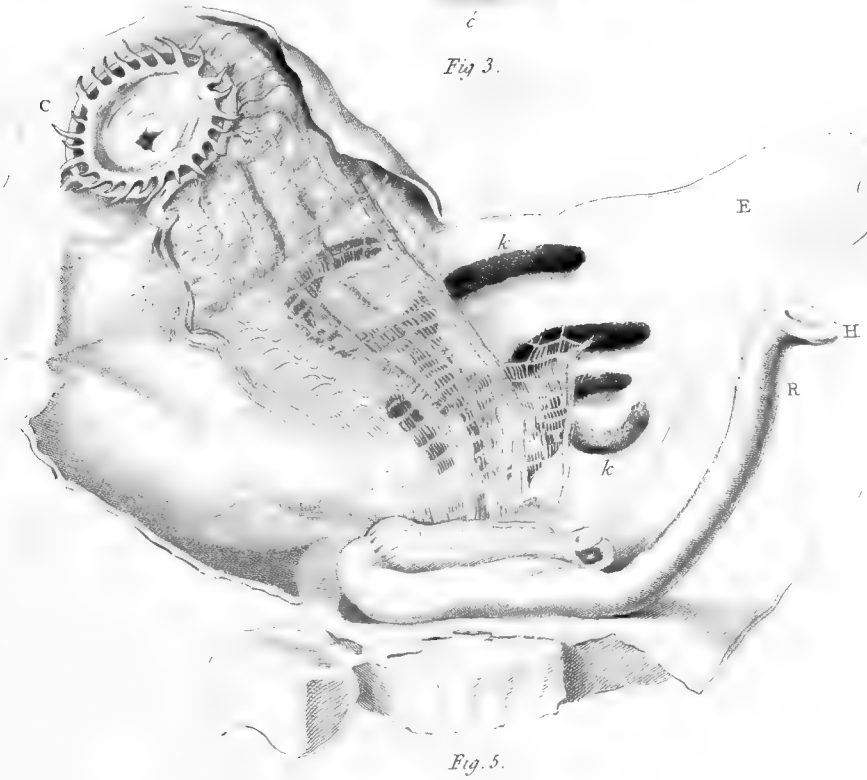


Fig. 5.

Fig. 6

W. S. Macleay del.

Dendrodoa glandaria

J. Curtis sc.
C. Fox sculp.

part of the cavity of the animal. The rectum is seen ascending towards the anal orifice, and is terminated by a simply-margined anus. The pharynx is a much smaller aperture than the anus, and communicates with a narrow curved œsophagus. The parts are nearly *in situ*.

C. Top thrown back, with internal view of branchial orifice.

k. Part of the branched and unique ovary, which answers to the left ovary of *Cynthia*.

A. Anal orifice.

E. Fragment of envelope.

R. Ascending rectum.

H. Anus.

N. Nervous tubercle, which appears to have been cut through on opening the animal.

Fig. 6. Sketch to show the manner in which the anus of *Dendrodoa glandaria* is kept suspended by a muscle attached to the side of the mantle.

N.B. In the foregoing explanation of the plates I have chosen the same letters to denote several organs, that are used to denote those organs in the valuable plates of M. Savigny.

XXVI. *A Description of a new Species of* Scolopax *lately discovered in the British Islands: with Observations on the* Anas glocitans *of Pallas, and a Description of the Female of that Species. By N. A. Vigors, Esq. A.M. F.L.S. Communicated by the Zoological Club of the Linnean Society.*

Read November 2, 1824.

The Natural History of these islands has been studied with so much science and assiduity, and the investigation attended with so much success, that any addition to the number of our species, more particularly in the higher classes of the Vertebrated Animals, must be of rare occurrence, and productive of considerable interest. It is therefore with much pleasure that I submit to this Society the following description of a species of *Scolopax*, new to the Ornithology of the British Islands; and of a species of the Linnean genus *Anas*, which, from its having been until recently but once only observed in this country, and from the specimen which was described not being at present in existence, or capable of being referred to, has been for some time considered as possessing but a doubtful claim to a place in the British Fauna.

Ordo.

Trans. Linn. Soc. Lond. XV. Pl. XXI. p. 557.

J. Curtis del. et sculp.

Scolopax Sabini

Ordo. GRALLATORES. Ill.

Fam. SCOLOPACIDÆ, mihi.

Genus. SCOLOPAX Auct.

SCOLOPAX SABINI.

S. castaneo atroque varia, subtus pallidior, pileo humeris pteromatibus remigibusque atris, rostro pedibusque fusco-atris.

TAB. XXI.

Rostrum fusco-atrum, *mandibulâ* superiore ad basin subcastaneâ. *Gula*, *genæ*, *pectus*que fusco-atræ, castaneo-maculatæ. *Abdomen* fusco-atrum castaneo-fasciatum. *Tectrices* inferiores, *remiges*que subtus fuscæ. *Dorsum scapulares*que intensè atræ castaneo-fasciatæ. *Rectrices* duodecim, ad basin atræ, ad apicem ferrugineæ atro-fasciatæ.

Longitudo *corporis*, rostro incluso, $9\frac{3}{10}$; *rostri* $2\frac{7}{10}$; *alæ* a carpo ad remigem secundam $5\frac{1}{10}$; *tarsi* $1\frac{1}{4}$.

In Mus. nost.

This species is at once distinguished from every other European species of *Scolopax*, by the total absence of white from its plumage, or any of those lighter tints of ferruginous-yellow, which extend more or less in stripes along the head and back of them all. In this respect it exhibits a strong resemblance to the *S. saturata* of Dr. Horsfield, from which however it sufficiently differs in its general proportions: and I find no description of any other extra European species of true *Scolopax* which at all approaches it in this character of its plumage. In the number of the tail-feathers again, which amount to twelve, it differs from *S. major*, which has sixteen, and *S. gallinago*, which has fourteen: it agrees however in this point with *S. gallinula*, which

also has but twelve; but it never can be confounded with that bird, from the great disproportion between the essential characters of both; the bill alone of *S. Sabini* exceeding that of the latter species by one third of its length. In the relative length and strength of the *tarsi* it equally differs from all. These members, although stouter than those of *S. gallinago*, fall short of them by $\frac{3}{20}$ of an inch: they are much weaker, on the other hand, than those of *S. major*, although they nearly equal them in length. In general appearance it bears a greater resemblance to *S. rusticola* than to the other European *Scolopaces*, but it may immediately be recognised as belonging to a different station in the genus; the two exterior toes being united at the base for a short distance, as in the greater number of the congeneric species; while those of *S. rusticola* are divided to the origin.

The only specimen of this species with which I am acquainted, the description of which is accompanied by a very accurate drawing by Mr. Curtis, is the bird in my possession. It was shot in the Queen's County, in Ireland, by the Rev. Charles Doyne, of Portarlington, in that county, on the 21st of August 1822; and was obligingly communicated to me the same day. I have named the species in honour of the Chairman of the Zoological Club of the Linnean Society, whose zeal and ability have thrown so much light upon the Ornithology of the British Islands*.

* Since the above communication was read to the Society, I have been enabled to record a second instance of this bird having been met with in the British Islands. On the 26th of October 1824, a female of this species was shot on the banks of the Medway, near Rochester, and is preserved in the valuable collection of Mr. Dunning of Maidstone. The specimen was kindly communicated to me by that gentleman, and was exhibited to the Zoological Club on the 23rd of November 1824. It accords in every particular with the specimen above described, with the exception of being somewhat smaller. This difference of size most probably indicates the difference of sex.

Ordo. NATATORES, Ill

Fam. ANATIDÆ, Leach.

Genus. QUERQUEDULA, Briss.

QUERQUEDULA GLOCITANS.

Q. fusca nigro-undata, capite viridi supra nigro subcristato; maculâ ante poneque oculos ferrugineâ, pectore ferrugineo maculis nigris, tectricibus duabus mediis lateralibus longioribus.

Anas glocitans. *Pallas, Acta Stock.* 1779. xl. *t.* 33. *f.* 1.
———————— *Gmel. Syst.* i. *p.* 526.
———————— *Lath. Ind. Orn. p.* 862.
Bimaculated Duck. *Pennant, Brit. Zool. vol.* ii. *p.* 602. *t.* 100. *f.* 2. *ed.* 1776.

MAS. *Rostrum* plumbeum, dertro nigro. *Pileus* niger ferrugineo-varius. *Genæ collique* latera virides. *Guttur* viridi-nigrum. *Pectus abdomenque* medium ferruginea, maculis nigris, superioribus rotundis, inferioribus ovalibus. *Dorsum abdominisque* latera fusca lineis nigris gracilibus undata. *Scapulares* nigro-undatæ, ad apicem nigræ. *Ptila, pteromataque* superiora fusca, his fasciâ latâ ferrugineâ apicali marginatis; inferiora alba. *Remiges* fuscæ; speculo violaceo-viridi, fasciâ mediâ nigrâ, apicali albâ. *Uropygium, caudæque tectrices* viridi-nigræ. *Rectrices* fuscæ, albido-marginatæ, duabus mediis nigris, laterales longitudine excedentibus. *Pedes* lutei, membrano in medio nigro.

Longitudo *corporis*, rostro incluso, $15\frac{3}{4}$; *rostri* ad frontem $1\frac{9}{10}$, ad rictum $2\frac{1}{10}$; *alæ* a carpo ad remigem secundam $8\frac{3}{5}$; *tarsi* $1\frac{1}{2}$.

FŒM. *Rostrum* plumbeum dertro fusco. *Caput gutturque* albidè

bidè ferruginea, isto nigro-lineato, hoc parcè nigro-sparso. *Pectus*, *dorsum*, *uropygium*, *abdominis*que latera fusca ferrugineo-marginata. *Abdomen* subtus album. *Rectrices* mediæ fuscæ, lateralibus haud longiores. *Alæ*, *pedes*que ut in mare.

Longitudo *corporis*, rostro incluso, $15\frac{1}{2}$; *rostri* ad frontem $1\frac{7}{10}$, ad rictum 2; *alæ* a carpo ad remigem secundam $8\frac{1}{5}$; *tarsi* $1\frac{9}{20}$.

In Mus. nost.

The male of this species was first described by Mr. Pennant in his "*British Zoology*," under the name of *Bimaculated Duck*, and introduced as an inhabitant of the British Islands in the following words:—"Taken in a decoy in 1771, and communicated to me by —— Poore, Esq.*" The same bird was afterwards described and figured by Dr. Pallas in the "*Acta Stockholmiensia*" for 1779 as a native of Siberia, frequenting Lake Baikal and the River Lena; and was named by him *Anas glocitans*. On the authority of Mr. Pennant† the species has subsequently been included among the Birds of Great Britain by writers on British Ornithology; but no further account has reached us of the specimen alluded to by that distinguished naturalist, nor has it been ascertained whether it was preserved after it was communicated to him. The specimens of both male and female, from which I

* Vol. ii. p. 603.

† I take Mr. Pennant's authority (see *Arctic Zoology*, p. 575.) for determining that his *Bimaculated Duck* and the *Anas glocitans* of Dr. Pallas are the same species. From the figure given in the "*Acta Stockholmiensia*," I could scarcely myself draw that conclusion; the round spots on the side of the head in the former species being superseded by long narrow stripes in the figure of the latter; while the tail is completely rounded, the two middle feathers not being longer than the rest. Mr. Pennant's own figure of this bird is an excellent representation. I must here notice what appears to be a slight difference between our two birds. In the *British Zoology* the species is described as having twelve tail-feathers: in my specimens, both of male and female, there are sixteen.

have

have taken the above description, were sent up from a decoy near Maldon in Essex, to Leadenhall-market, in the winter of 1812-13. Here they were observed by a respectable naturalist*, who immediately purchased them and set them up. From his collection they have subsequently passed into mine. There can be little doubt of the two birds being sexes of the same species. They agree in all the essential particulars that serve to identify the species of this family; their bill, legs, and feet exactly according in structure, and the colouring and markings of the *speculum* on the wings, a distinguishing character among the *Anatidæ*, being precisely the same. We have moreover, in favour of this conclusion, the negative evidence that the other sex of neither of these birds has until now been ascertained; and we have the positive evidence that both these specimens were taken in the same decoy and at the same time.

The *Querquedula glocitans*, or *Bimaculated Duck*, is readily distinguished from every other species of the family by the two ferruginous spots on the cheeks, in conjunction with the form of its tail, in which the two middle feathers somewhat exceed the others in length. The other European species of the *Anatidæ*, whose tails are elongated, are the *Anas glacialis*, *A. boschas*, and the *A. acuta* of Linnæus†. From the former of these it is at once distinguished by strong generic characters; the *A. glacialis*‡, from its lobated *hallux*, its legs being thrown behind the equilibrium of the body, and its consequently superior habits of swimming and diving, being placed at that extreme end of the family which leads off to the true oceanic birds, or typical *Natatores;* while the *Q. glocitans* belongs to those groups, which,

* Mr. George Weighton, of Fountain Place, City-road.

† These are the *Harelda glacialis*, *Anas boschas*, and *Dafila acuta* of Shaw's Zoology.

‡ The *Anas nigra*, Linn. also has the tail somewhat acute; but, equally with *A. glacialis*, stands at a remote extreme of the family from *Q. glocitans*.

with

with a free *hallux*, legs placed within the equilibrium of the body, and inferior powers of swimming and none of diving, affect the neighbourhood of fresh waters, feed occasionally on land, and as such form part of the aberrant subdivisions of the Natatorial Order. It is evidently remote from *A. boschas*, of which the middle tail-feathers also appear the longest, but which are invariably curved upwards. While it may also be perceived to hold a different station from *A. acuta*, which, although closely allied to the same group, yet from its long neck and legs is found to stand at that remote end of it where it is connected with the *Anseres*, the next conterminous division of the family. Its nearest affinity among the European species is to the *A. circia*, Gmel., and *A. crecca*, Linn.*

The appearance of this species in the British Islands seems of rare occurrence; two instances only of the kind having been recorded. These most probably are to be attributed to some extraordinary accident or stress of weather.

* The *Querquedula circia* and *Q. crecca* of modern Ornithologists.

XXVII. *A De-*

XXVII. *A Description of such Genera and Species of Insects, alluded to in the "Introduction to Entomology" of Messrs. Kirby and Spence, as appear not to have been before sufficiently noticed or described. By the Rev. William Kirby, F.R.S. and L.S. &c. Communicated by the Zoological Club of the Linnean Society.*

Read December 21, 1824.

Decade the First.

As many insects are noticed in the *Introduction to Entomology* that either properly belong to genera not yet established, or are altogether unknown, or have not before been specifically described, I shall take the liberty of presenting to the Zoological Club, by decades, or larger portions, as my avocations may permit, descriptions of them, beginning with some *Coleoptera*. The first I shall notice is one of the many additional new genera that may be separated from the great Linnean genus *Carabus*.

Fam. *Lebiadæ*.

Hexagonia.

Labrum transversum antice ciliatum.

Mandibulæ forficatæ, edentulæ, triquetræ, acutæ.

*Labium** trilobum: lobis lateralibus triangularibus longioribus acutis, intermedio obtuso supra inæquali.

* The *Labium* of the *Introduction to Entomology*, for reasons there assigned, is synonymous with the *Mentum* of M. Latreille; and the *mentum* is the piece on which the latter sits.

*Lingua** tenuis apice furcata, utrinque paraglossa recta lineari.
Mentum breve, transversum, supra inæquale.
Maxillæ apice spina recta inflexa.
Palpi labiales triarticulati: articulis duobus primis tenuioribus subcylindricis primo brevissimo: extimo crassiori arcuato,
—— *maxillares* mandibulis longiores quadriarticulati: articulo primo brevissimo; secundo sequentibus crassiori apicem versus sensim incrassato, tertio obconico, extimo subfusiformi.
Antennæ filiformes, capite thoraceque longiores; articulo primo reliquis crassiori cylindrico; secundo minutissimo.

Corpus valde depressum. *Caput* thoracis fere magnitudine, postice collo distincto. *Prothorax* postice attenuatus, utrinque in angulum obtusum prominens, ita ut fere hexagonus evadit. *Pedes* tibiis anticis intus emarginatis, tarsis omnibus dilatatis: articulo penultimo bilobo. *Elytra* haud abbreviata, prope apicem externe subemarginata. *Abdomen* ano obtuso.

This genus appears to connect the *Lebiadæ* with the *Galeritidæ*. The type is, I suspect, oriental, and appears quite distinct from any genus at present defined.

terminata. H.

Long. corp. lin. 4. circiter.

Habitat in India Orientali?

Introd. to Ent. iii. 540. note [b].

DESCR. *Caput* fere pentagonum uti *Forficulæ*, nigrum: ore antennisque rufis; hæ thorace vix breviores. *Frons* antice utrinque longitudinaliter excavatus, pone oculos utrinque item fossula excavata. *Prothorax* niger, in medio et lateribus longitudinaliter canaliculatus. *Pedes* testacei. *Elytra*

* The *Lingua* of the above work is synonymous with the *Ligula* Latr.

rufa

rufa apice nigra, striata: striis punctatis; puncto insuper majori apici propiori in interstitio inter strias a suturâ secundam et tertiam. *Abdomen* rufum.

I purchased this insect at Mr. Marsham's sale; and from the pin by which it is transfixed I conjecture that it is one of those collected by Major-general Hardwicke in India.

Familia *Scarabæidæ* MacLeay.

Genus Onthophagus Latr.

cervicornis. O. nigro-æneus, thorace mutico, vertice cornubus duobus erectis arcuatis subramosis.

Long. corp. lin. 5.

Introd. to Ent. iii. 311.

Habitat in Georgia Amer.? Ex. Mus. D. Francillon.

Descr. *Corpus* nigro-æneum nitidum. *Caput* antice margine reflexo subemarginato, postice cornubus duobus erectis arcuatis latere exteriori apici propius dente s. ramulo brevi armatis. Pone cornua in occipite tuberculum depressum lævigatum transversum. *Prothorax* muticus antice utrinque subretusus.

Alt. sex. Cornu *verticis* brevi truncato subemarginato, fronte transverse bicarinato. *Prothorax* antice medio tuberculis duobus lævigatis obtusis armatus.

Aries. O. niger, thorace mutico, occipite lamina lata reclinata cornubus duobus inflexis nutantibus apice armata.

Long. corp. lin. 4.

Introd. to Ent. iii. 311.

Habitat ——. Ex. Mus. D. Francillon.

DESCR. *Corpus* nigrum subnitidum. *Caput* margine antico reflexo subemarginato, postice lamina lata lævi, basi angustiori reclinata apice utrinque cornu inflexo valido nutante armata. *Prothorax* anticè subretusus.

Familia *Dynastidæ* MacLeay.

Genus MEGASOMA.

Introd. to Ent. iii. 311.

Labrum corneum brevissimum, sinu antice subexcisum, naso obumbratum, densissime barbatum.

Mandibulæ validissimæ subtriquetro-trigonæ, apice bidentatæ, basi dilatatæ, hirsutie rariori barbatæ: mola, vel dente molari basis, subrotunda excavata.

Labium corneum, oblongum, apice constrictum barbatum, lobis duobus triangularibus terminatum.

Lingua omnino tecta et intra os retracta.

Mentum brevissimum.

Maxillæ lobo exteriori edentulo corneo, interiori obsoleto, subtus hirsutissimæ.

Palpi labiales triarticulati: articulis duobus primis obconicis, extimo longiori oblongo apice rotundato.

Palpi maxillares quadriarticulati: articulo primo brevissimo, secundo longiori obconico apice rotundato.

Antennæ decem-articulatæ: articulo primo apice incrassato, sequentibus sex brevissimis fere moniliformibus, clava oblonga trilamellatâ.

Corpus crassissimum. *Caput* vertice in cornu recurvum, basi dente intus armatum apice furcatum, in masculis prominens. *Nasus* truncatus retusus. *Prothorax* plerisque antice bicornis, prominentia insuper intermedia obtusa, in aliis

aliis (*M. Typhon*) tricornis evadit. *Fœm. Vertex* mucronatus. *Prothorax* inermis.

Type of the genus *Scarabæus Actæon* L.

Genus Dynastes MacLeay.

Labrum cum naso fere connatum, et sub illo penitus latitans.

Mandibulæ validissimæ subtriquetro-trigonæ, basi dilatatæ, intus tomento denso brevi barbatæ: mola sublunata transverse carinata et substriata.

Labium obcordatum, apice barbatum constrictum at vix bilobum.

Lingua retracta.

Mentum brevissimum.

Maxillæ apice tridentatæ: dentibus spiniformibus, subtus hirsutæ.

Palpi omnes et *Antennæ* fere ut in *Megasomate*.

Corpus oblongum. *Maris Caput* cornu demum recurvo. *Prothorax* fere obinfundibuliformis: cornu supra caput protenso incurvo.

Type of the Genus *Scarabæus Hercules* L.

Genus Archon.

Labrum cum naso connatum vix distinctum.

Mandibulæ apice rotundatæ edentulæ.

Labium obcordatum, apice constrictum bilobum.

Lingua retracta.

Mentum brevissimum.

Maxillæ apice fornicatæ truncatæ, intus dente unico armatæ.

Palpi omnes et *Antennæ* ut in præcedentibus.

Corpus oblongum. *Caput* vertice subcornuto cornu emarginato. *Prothorax* in medio antice transverse carinatus.

emarginatus.

emarginatus. A.

Long. corp. unc. $2\frac{1}{4}$.

Habitat ——. Ex. Mus. D. Francillon.

Introd. to Ent. iii. 446.

DESCR. *Corpus* nigrum. *Caput* rugosum. *Nasus* apice subemarginatus. *Vertex* cornu brevi emarginato. *Occiput* tuberculis tribus obsoletis. *Prothorax* antice rugulosus, carina antica transversa utrinque abbreviata. *Elytra* piceo-nigra lævigata: sutura basi incrassata.

The group forming the Fabrician genus *Geotrupes* (*Scarabæus* Latr.), or Mr. W. S. MacLeay's family of *Dynastidæ*, has not been closely examined by entomologists, or it would have been discovered to be resolvable into many more genera or subgenera than *Phileurus*, *Oryctes*, and a few others that have been described; at least if variations in the *maxillæ*, *mandibulæ*, and other oral organs are admitted as sufficient indications of generic distinction. Those separated above from *Dynastes* are not only distinguished by characters derived from these organs, indicating differences in their mode of feeding, but their stature and external structure also point out some diversity in their habits: the gigantic stature of *Megasoma*, particularly as to width, and the horns of the head and thorax of the male, distinguish the species belonging to it—for instance, *M. Acteon*, *Elephas*, *Typhon*, &c.—from every other group of *Dynastidæ*. The same remark applies to *Dynastes*, to which belong *D. Hercules*, *Alcides*, *Tityus*, *Neptunus*, &c. &c. With regard to *Archon*, at present I am acquainted only with the species above described, that seems certainly to belong to the genus. *Geotrupes Cadmus* F. and affinities approach to it, but its *maxillæ* are different.

Familia

Familia *Rutelidæ*.

Genus MIMELA K. *in Linn. Tr.*

nigricans. M. nigro-picea; capite thoraceque punctatis, antennis brunneis*.

Long. corp. lin. 7.

Introd. to Ent. iii. 545.

Habitat in China.

DESCR. *Corpus* oblongum, glabrum, nitidum, nigro-piceum. *Caput* æneo tinctum punctatum punctulis haud interpositis ut in *M. chinensi*. Puncta antica confluunt. *Antennæ* brunneæ. *Prothorax* æneo tinctus, punctatus punctulis nullis interpositis. *Elytra* punctata: punctis quibusdam sparsis, et aliis seriatim ordinatis; seriebus per paria dispositis. Punctula itidem minutissima inter hæc puncta interposita. In aliis *M. chinensem* exactissime refert hæc species, sed minor est.

I purchased this insect at a dealer's in Leadenhall-street, who received it amongst a parcel of insects from China.

Familia *Cetoniadæ* MacLeay.

Genus GENUCHUS. *Cetonia* Oliv., Fabr.

Introd. to Ent. iii. 423, 517.

Labrum sub nasi rhinario† penitus absconditum.
Mandibulæ apice membranaceæ.

* The discovery of a second species renders it necessary to give a definition of *M. chinensis*. See *Linn. Trans.* xiv. 101—.

chinensis. M. supra luteo-virens; capite thoraceque punctatis punctulatissimisque, antennis fulvis.

† For the explanation of this term, see *Linn. Trans.* xiv. p. 103.

Labium

Labium quasi pedunculo elevatum, triangulare, cum rhinario os exactissimè claudens*.

Lingua retracta.

Mentum sub labio absconditum.

Maxillæ membranaceæ.

Palpi omnes filiformes.

Antennæ decem-articulatæ, brevissimæ: articulo primo magno incrassato arcuato, sequentibus sex brevissimis, clava subovata triphyllâ.

Corpus oblongum subdepressum. *Rhinarium* primum inflexum, demum reflexum, apice emarginatum. *Vertex* fovea magna. *Prothorax* subrotundus antice segmento circuli dempto. *Mesosternum* inter pedes intermedios mucronatum. *Calcaria* 1. 2. 2. *Unguiculi* 2. 2. 2.

Type of the genus, *Cetonia cruenta*, Oliv. *Regio*, Africa meridionalis.

Genus magis affine. *Cremastocheilus* Knoch.

Genus SCHIZORHINA (*Cetonia* Donovan, Kirby).

Introd. to Ent. iii. 482.

Labrum cum naso connatum sub illo latitans.

Mandibulæ membranaceæ.

Labium apice profunde bifidum, longius hirsutum, a mento vix distinctum.

Maxillæ lobo membranaceo, fere ut in reliquis *Cetoniadis*.

Palpi omnes sensim crassiores.

Antennæ decem-articulatæ: articulo primo incrassato, sequentibus sex brevissimis, clava triphylla.

Corpus subovatum, subdepressum. *Nasus* elongatus, profunde bifidus, labrum obumbrans et os superne claudens. *Pro-*

* *Introd. to Ent.* iv. PLATE XXVI. FIG. 34. b.

thorax

thorax trapezoideus, vel triangularis: vertice trianguli truncato, postice segmenti circuli dempto pro receptione basis scutelli. *Scutellum* triangulare magnum. *Calcaria* 1. 2. 2. *Unguiculi* 2. 2. 2. *Mesosternum* apice dilatatum, triangulare, ad basin manuum attingens. *Podex* apertus.

Type of the genus, *Cetonia atropunctata* Kirby*. *Regio*, Australasia.

Cognate genus, *Chasmodia* MacLeay.

Genus Gnathocera. (*Cetonia* Latr.)

Introd. to Ent. iii. 488.

Labrum sub naso reconditum, membranaceum.

Mandibulæ extus corneæ, intus lamina lata membranacea, villosa.

Labium oblongum, apice emarginatum.

Mentum brevissimum, transversum.

Maxillæ subtriquetro-trigonæ corneæ, intus pilis crebris incurvis ciliatæ: lobo brevissimo hirsuto.

Palpi sensim crassiores.

—— *labiales* triarticulati: articulo primo brevissimo, secundo longiori obconico, extimo longiori crassiori obovato.

—— *maxillares* quadriarticulati: articulo primo brevissimo, secundo fere obturbinato, tertio conico, extimo præcedentibus longiori crassiori tereti.

Antennæ decem-articulatæ: primo arcuato apice incrassato, sequentibus sex brevissimis, clava triphylla.

Corpus vix depressum. *Nasus* dente intermedio triangulari terminatum. *Rhinarium* inflexum, vicem labri gerens et os superne claudens. *Genæ* in cornu rectum horizontale angulatum acutum productæ. *Prothorax* subtrapezoideus,

* *Linn. Trans.* xii.

postice segmento circuli dempto ut in præcedente. *Scutellum* triangulare. *Mesosternum* descendens, ultra basin manuum productum, *Podex* apertus.

Type of the genus, *Cetonia vitticollis*, Latr. MS. *Regio*, Africa. Cognate species, *Cetonia africana*, *elegans*, &c.

vitticollis. Gn. atra subtus pallido variegata, thorace vittis tribus fulvis, elytris luteis margine nigris; maculis marginalibus apicisque fulvis.

Long. corp. lin. 8.

DESCR. *Corpus* atrum glabrum subtus lateribus pollinoso-pallidis nigro-lineatis. *Caput* maculis quatuor pollinoso-pallidis, duabus nempe lanceolatis inter oculos, et duabus aliis subtriangularibus pone oculos. *Prothorax* punctatus; vittis tribus, intermedio utrinque abbreviato angustiori, pollinoso-fulvis lævibus. *Elytra* sordide lutea, punctato-striata, sutura margineque externa nigris. In hoc margine series macularum et punctorum interdum confluentium, pollinoso-fulvarum. *Femora* antica intus, intermedia utrinque, et postica extus, pollinoso-pallida. *Abdomen* serie intermedia ventrali e maculis quatuor piloso fulvis pilis decumbentibus, ornatum. *Podex* maculis duabus magnis triangularibus pollinoso-fulvis.

immaculata. Gn. atra, immaculata, elytris luteis; marginibus atris.

Long. corp. lin. 7.

Præcedenti per omnia simillima, sed maculæ nullæ pollinosæ corpus ornant. Series tantummodo macularum piloso-fulvarum ventrem signant.

XXVIII. *De-*

XXVIII. *Description of Cowania, a new Genus of Plants; and of a new Species of Sieversia. By Mr. David Don, Libr. L.S.*

Read November 2, 1824.

In an extensive Mexican collection, forming part of the Herbarium of the Spanish botanists Sessè and Mocinno, which has lately come into Mr. Lambert's possession, are specimens of two remarkable plants belonging to the family of the *Rosaceæ:* one of them forms a very singular new genus, and the other has all the essential characters of *Sieversia*, but widely different in its habit. I have named this new genus *Cowania*, a name which is intended to commemorate the botanical zeal and acquirements of James Cowan, Esq., who, as a merchant, had several times visited Mexico and Peru; from whence he has introduced many new plants, some of which have now become common in our gardens,—such as *Cineraria Petasites* and *Inula glauca*. The showy *Solanum amazonium*, *Russelia multiflora*, *Chrysiphiala flava*, and *Allium Cowani* were first introduced by him. Mr. Lambert received from him in 1823 a rich collection of seeds and bulbs: among the latter were *Chrysiphiala urceolata* and *Amaryllis candida*. A number of plants, some of them apparently new, have been raised in the stoves at Boyton from the seeds, and are likely soon to produce flowers. Much was still to be expected from Mr. Cowan's exertions in the advancement of his favourite pursuit; but alas! death deprived science of his labours. He died at Lima in the autumn of 1823, deeply regretted

by all his acquaintance. In the natural system *Cowania* must be placed near to *Dryas*, with which it agrees in the uniformity of the divisions of the calyx, being destitute of the accessory segments found in *Sieversia*, *Geum*, *Potentilla*, &c., and likewise in having coriaceous, reticulated leaves, naked and shining above, woolly underneath, and with their margins revolute. It is to be observed, however, that in *Dryas* the calyx is 8- or 10-cleft, and scarcely tubular, the leaves undivided, and the flowers white, on long footstalks; but the most important character of *Cowania*, by which it is at once distinguished from *Dryas* and all its co-ordinates, is to be found in the reduced number of its pistils, which are from five to eleven —a very small number, when compared with that of other genera of this family. The hollow pear-shaped calyx of this plant points out decidedly the true nature of the fruit in *Rosa*, which is nothing more than the tube of the calyx formed into a kind of receptacle, as has been justly remarked by our learned President and Mr. Woods. There cannot, I think, be a shadow of doubt as to the propriety of uniting the *Potentillæ* of Jussieu, the *Dryadeæ* of M. Decandolle, with *Rosa* in the same natural family. I shall now proceed to give descriptions of these two plants.

COWANIA.

Char Essent. *Calyx* 5-fidus. *Petala* 5. *Ovaria* 5—11: *ovulo* erecto. *Styli* terminales, continui. *Achenia* stylis plumosis persistentibus aristata. *Embryo* erectus.

Descr. *Flores* polygami. *Calyx* obturbinatus basi attenuatâ tubulosus, intùs striis numerosis parallelis exaratus, extùs glandulis tectus, limbo 5-fidus: *lobis* subæqualibus subrotundo-ovalibus, patulis, retusis cum mucronulo; *accessoriis* nullis.

nullis. *Petala* 5, obovata, retusa, caduca, fauci calycis inserta. *Stamina* indefinitè numerosa, persistentia, duplici serie fauci calycis inserta: *filamenta* capillaria, glabra: *antheræ* subrotundo-ovales, peltatæ, biloculares, duplici rimâ longitudinali dehiscentes. *Ovaria* definita (5—11), densè villosa, fundo tubi calycini adnata. *Styli* totidem, longissimi, terminales, continui, villis mollissimis plumosi. *Stigmata* filiformia, nuda. *Achenia* elliptica, erecta, basi attenuata, stylis longissimis (nunc bipollicaribus) totis persistentibus valdè plumosis aristata. *Semen* solitarium, exalbuminosum, testâ coriaceâ fuscâ obvolutum. *Embryo* erectus, lacteus, cavitati seminis conformis: *cotyledones* spathulatæ, plano-convexæ, obtusissimæ: *radicula* crassa, recta, cotyledonibus ter brevior, centripeta, basi attenuata. *Plumula* inconspicua.

Frutex *erectus, ramosissimus.* Ramuli *brevissimi, conferti, teretes, foliosi, undique densè lanati.* Folia *alterna, sessilia confertissima, parva, linearia, coriacea, margine integerrima ac revoluta, suprà glandulosa, viridia et nitida, subtùs niveo-lanata, vix semipollicaria, apice dilatata ac tripartita: segmentis linearì-oblongis, obtusissimis, margine revolutis.* Stipulæ *binæ, membranaceæ, dilatatæ, integerrimæ, sericeæ, secus petiolorum bases adnatæ, imbricatæ, acumine lineari-subulato libero.* Flores *aurei, numerosi, sessiles, in apice ramulorum solitarii, magnitudine eorum* Potentillæ fruticosæ.

1. C. mexicana. Tab. XXII. Fig. 1.

Habitat in Mexico. *Sesse et Mocinno.* ♄. (v. s. sp. in Herb. Lamb.)

SIEVERSIA. *Willd. Brown.*

Calyx decemfidus, laciniis alternis accessoriis. *Petala* 5. *Stamina* indefinitè numerosa. *Ovaria* indefinita, ovulo adscendente.

dente. *Styli* terminales, continui. *Achenium* stylo toto persistenti aristatum. *Embryo* erectus.

Habitus *fere, nec omnino* Gei, *quod differt* stylis *geniculatis articulo superiore dissimili sæpiusque deciduo.* Brown in Suppl. to Parry's Voy. p. 276.

1. *S. paradoxa*, foliis fasciculatis linearibus obtusis sessilibus integris 3- v. 5-fidis, floribus subcorymbosis, stylis plumosis, caule fruticoso. Tab. XXII. Fig. 7.

Geum plumosum. *Sesse et Mocinno Mss.*

Habitat in Mexico. *Sesse et Mocinno.* ♄. (v. s. sp. in Herb. Lamb.)

Frutex erectus, ramosissimus, rigidus. *Rami* teretes, pilosi, supernè foliis ferè destituti, apice 1—3-flori. *Folia* parva, fasciculata, linearia, sessilia, obtusissima, simplicia v. sæpiùs trifida aut quinquefida, coriacea, suprà pilosa, subtùs, cum junioribus omninò, ferrugineo-lepidota, margine integerrima et revoluta. *Stipulæ* parvæ, lineari-lanceolatæ, acutæ, ciliatæ. *Flores* subcorymbosi, pedunculosi, magni, speciosi, aurei. *Calyx* amplus, 10-fidus, disco dilatatus, concavus, extùs pube ferrugineâ densè vestitus: *laciniis* ovatis, concavis, mucronatis, nunc tricuspidatis, margine integerrimis; *alternis* accessoriis, minimis, lanceolatis, acutis, rarò apice bidentatis. *Petala* 5, obovata, emarginata, subpersistentia, fauci calycis inserta. *Stamina* numerosissima, persistentia, triplici serie fauci calycis inserta. *Receptaculum* conicum, densè pilosum. *Ovaria* indefinita (60—100), hirsutissima: *ovulo* adscendente. *Styli* totidem, terminales, continui, longissimi, valdè plumosi. *Achenia* ovata, stylo longissimo plumoso toto persistenti aristata, *testâ* coriaceâ: *albumen* nullum. *Embryo* erectus, lacteus: *cotyledones*

J.D.C. Sowerby del. et sculp.

dones spathulatæ, plano-convexæ : *radicula* subulata, cotyledonibus duplò brevior, recta, centripeta.

The habit of this plant, so widely different from that of the species of *Sieversia* hitherto recorded, led me at first to suspect it might prove a distinct genus ; but after a careful examination of the parts of fructification, I could discover nothing material to confirm my suspicion. A comparison of the description of this plant with Mr. Brown's excellent character of *Sieversia*, given above, will show how nearly they coincide in every essential point. The other species of *Sieversia* are all herbaceous plants, with the habit of *Geum*.

EXPLANATION OF TAB. XXII.

Fig. 1. A Branch of *Cowania Mexicana.*
2. A Leaf, magnified.
3. Calyx laid open to show the inside of the tube, and the situation of the ovaria.
4. An Achenium surmounted by the persistent Style.
5. The Embryo—natural size.
6. The same magnified.
7. A Branch of *Sieversia paradoxa.*
8. A Leaf of the same magnified.
9. Achenium of the same.
10. Embryo of the same magnified.

XXIX. *Description of the Buceros galeatus from Malacca. By Major-General Thomas Hardwicke, F.R.S. and L.S.*

Read February 18, 1823.

BUCEROS GALEATUS. *Gmel.*

Helmet Hornbill. *Lath.*

Buceros niger, abdomine albo, rectricibus albido-flavescentibus fasciâ nigrâ, rostro conico subflavo; galeâ subquadrato-convexâ rubrâ fronte subflava.

Tab. XXIII.

A good specimen of this bird having been presented to the Museum of the Asiatic Society by Major Farquhar, the drawing of it herewith presented to the Linnean Society was executed under my personal inspection.

The *Bill* is sub-conical (not including the casque); both mandibles straight, the edges sharp, and not serrated; greatest length 8 inches. The lower mandible has a convexity near the gullet; both mandibles as far as the front of the casque are yellowish-white, the front of the casque of the same colour, and all the rest of a deep red: the depth of the upper mandible, including the casque, 3 inches $\frac{4}{10}$ths; in length at top 3 in. $\frac{3}{10}$ths; and in thickness 2 in. $\frac{3}{10}$ths.

The *Eyes* are large, and encircled in a naked red skin of three concentric circles; the margin of the inner one ciliated with

Trans. Linn. Soc. Vol. XIV. Tab. 23 p. 578.

Buceros galeatus.

Weddell sc

with long stiff black hairs. The irides yellow, pupils round and black; the posterior margin of the outer circle is furnished with different coloured feathers from those of the neck; all the upper part of the neck finely feathered with black; the under part of the throat and gullet naked, and of a fine red. The neck is in length 8 inches.

The *Nostrils* of this bird are singularly situated, being above the eye, and just behind the casque, concealed by feathers. The auditory passage is covered with the long buff-coloured feathers behind the eye.

The *Body* is about as large as that of a goose, and in length 10½ inches. The tail, which is cuneiform, consists of 12 feathers: the 8 first from 12 to 13 inches in length; the two next 30 inches; and the two middle ones 33 inches; making the total length of the bird 4 feet 8½ inches.

The *Legs* are short for so large a bird, being only 3 inches from knee to foot: the toes long, foot broad, claws very strong and arched; colour of the legs a fine red.

The *Plumage* of the upper part of the body, wings and breast, is black; of the abdomen, thighs and vent, white. The tail of a yellowish white, each feather with a black bar, 2 inches broad, within an inch of the tip: the ends of the great wing-coverts are also edged with white.

The progressive motion of the birds of this genus, although their feet are formed for walking, is always by jumping or hopping. I have kept several species alive, and they all moved in the same manner.

In a state of nature these birds in this part of India live on wild fruits. In confinement they feed freely on plantains and on boiled rice. At night they perch with great security, al-

though the largeness of the foot seems better suited to rest on the ground.

The Figure gives the general habit of the complete bird on a reduced scale.

According to Major Farquhar, this bird is a native of Malacca, and the Malay name is "*Tibbang Muntovah.*"

Calcutta, January 6, 1822.

XXX. *Ex-*

XXX. Extracts *from the* Minute-Book *of the* Linnean Society *of* London.

Jan. 21, 1823. Read a Communication from Major-general Hardwicke, F.L.S., containing a Description, accompanied with a Drawing, of the *Cervus Pygargus* of Pallas, or *Tail-less Deer*, a native of the snowy mountains and plains of Muktinauth, about five weeks' journey from the valley of Nepaul, in a north-west direction. The subject examined was a full-grown male, 7 feet 8 inches in length from the tip of the upper lip to the extremity of the very short tail, and 4 feet 3 inches in height.

Major-general Hardwicke also communicated to the Society an account of the Wild Sheep, or *Ovis Argali* of Pallas, common to the mountains and plains between the Himáláya range and the valley of Nepaul.

Feb. 18. Alterations in the 2d Section of Chapter II. and the 2d Section of Chapter X. of the Bye-Laws of the Society having been proposed by the Council, and read at the last two General Meetings, as directed by the Charter, were put to the ballot, and confirmed. The altered Laws are as follows, viz.

Chap. II. Sect. 2.

" Every person who shall be elected a Fellow after the 24th day of May 1823, shall, before he be admitted,

mitted, pay to the use of the Society the sum of Five Guineas for his Admission Fee: and if any such person refuse or fail to pay the said sum, his election shall be void, unless the Admission Fee be remitted in whole or in part by a special order of the Council."

CHAP. X. SECT. 2.

"Every sum of money payable on account of the Society, amounting to Five Pounds or upwards, shall be paid by order of the Council, signed by the President or Vice-President in the Chair, and registered by the Secretary."

Read a Description, by Major-general Hardwicke, of the *Sciurus Petaurista* of Linn. from Singapore, where it is frequently seen springing playfully among the trees in forests.

March 4. Major-general Hardwicke communicated a Description and Drawing of the *Boa phrygia* of Shaw, which the General considers as a species of *Coluber*, the subcaudal scales, at least in some specimens, being all divided.—"The habits of this serpent are very active. Like other serpents it was sluggish about the time of its periodical changes of skin, viz. every thirty or thirty-five days, and it seldom appeared inclined to take food while under that operation; but soon after having cast the old skin it readily took what was put into the cage. Within twelve months it had eaten four chickens, two pigeons, two rats, and one crow. Its total length was 8 feet 2 inches, of which the tail measured 14 inches."

June

June 17. Major-general Hardwicke communicated an Account of the *Buceros undulatus* of Shaw, 36½ inches in length, including the bill of 7 inches and tail of 12 inches.—"This bird when taken seemed to have attained its full growth; at least it did not increase in size during the two years it was confined in a cage. Its habits were playful and docile. It was fed on plantains and boiled rice. It died when moulting, and fell suddenly from its perch. Its weight, in good condition, was 5 pounds 2 ounces. It is a native of the woods about Chittagong and Sylhet."

Nov. 4. Dr. Sims, F.L.S. communicated to the Society an Extract of a Letter from W. Fothergill, Esq. of Carr-end, near Arkrigg, in Yorkshire, containing a notice of the *Falco furcatus* Linn. having been taken alive in Shawgill, near Hawes in Wensleydale, in that county, on the 6th of September 1805. Mr. Fothergill states, that, "apparently to avoid the violence of a tremendous thunder-storm, and the clamorous persecution of a flock of rooks which attacked it at the same instant, it took shelter in a thicket, where it was seized before it could extricate itself. The person who caught it kept it a month; but a door being accidentally left open, it made its escape. It first alighted on a tree at no great distance, from which it soon ascended in a spiral flight to a great elevation, and then went steadily off in a southerly direction as far as the eye could trace it."

Mr. Fothergill also states, that the *Rallus pusillus* of Gmel. (*Gallinula minuta* of Montagu and *G. pusilla* of Temminck) "was shot on the 6th of May 1807, by John

John Humphrey, Esq. of Wensley, on the banks of the Yore, near that place. It was alone, and suffered itself to be approached very near without betraying any sense of danger. It ran with great rapidity, carrying its tail erect."

Colonel Montagu has given an account of a bird of this species having been killed in England in 1809, and it had not before been noticed as a British bird.

Feb. 3, 1824. Read a Letter from John Hogg, Esq. M.A. F.L.S., of Norton, near Stockton-on-Tees, containing an account of the Golden Eagle (*Falco chrysaetos* Linn.) having been shot near the mouth of the Tees on the 5th of November last.

April 20. Sir Thomas Gery Cullum, Bart. F.L.S. exhibited specimens of the *Sirex juvencus* Linn., and a piece of Scotch Fir (*Pinus sylvestris*) which had been perforated by it. These were communicated to Sir Thomas by the Countess of Stradbroke, who informed him that nearly 200 trees of the Scotch Fir have been destroyed by this insect in the Earl of Stradbroke's woods, at Henham-Hall, in Suffolk. It is stated, that the man who has the superintendence of the woods has for some time observed the trees in a part of the park to be more or less sickly; but until within the last three or four years he had attributed the decay of the trees to the poverty of the soil.

June 15. The Secretary exhibited a hermaphrodite Insect, of which the left side is that of *Papilio Laodocus* Fab., and the right side that of *Papilio Polycaon* Fab., thus proving

proving that these insects, which have been hitherto considered as distinct species, are the sexes of the same, *P. Polycaon* being the male. This interesting specimen is from Brazil, and was sent to Mr. MacLeay by John Dixon, Esq., of Rio de Janeiro.

Nov. 2. Mr. James De Carle Sowerby, F.L.S., presented specimens of a Fresh-water Shell, probably the *Mytilus polymorphus*, Gmel. 3363, which is found in abundance, attached to shells and timber, in the Commercial Docks by James Bryant, Esq., who uses the animal as bait for perch. Mr. Sowerby observes, that "the strong resemblance which it bears to the marine *Mytili* is very remarkable. Independently, however, of the *septa* within the valves, there are many other differences to be observed, several of which are in the structure of the included animal, although it possesses a strong *byssus:* among others, the foot is small, and the lips of the mouth are differently placed, being more like those in the animal of the *Unio ovalis*. It has two tubes, and the mantle is united almost all round, and bordered with a band of bright orange between two bands of black. Some of the *septa* within the beaks appear to be a kind of disease, as they are not constant. The same species is found in the Danube, and in the rivers of Russia; but the British specimens are much larger and finer than any foreign ones I have seen."

Nov. 16. Read a Letter from Mr. John Atkinson of Leeds, F.L.S., accompanied with some specimens of Coleopterous Insects which were discovered among the linen

linen immediately enveloping the body of a mummy from Thebes, which was recently presented to the Museum of the Philosophical Society of that town. Mr. Atkinson states, that "the subject appears to have been a person of ordinary cast, and not preserved with the care usually bestowed on the bodies of persons of a higher rank. The viscera and internal parts have contained thousands of larvæ, which have been prevented from arriving at their perfect state by the process of embalming being finished. Few of the insects had penetrated more than through two or three folds of cloth, and there perished."

Since the above communication was received, Mr. J. S. Miller of Bristol, A.L.S., has transmitted some specimens of Insects found by him on the unwrapping of an Egyptian mummy. The insects proved in both cases to be the same, and were undoubtedly *Dermestes vulpinus* and *Necrobia violacea*, although of a much lighter colour than usual.

Nov. 16. Read some Observations on the *Motacilla Hippolais* of Linn. by the Rev. Revett Sheppard, M.A. F.L.S. Mr. Sheppard considers that "all succeeding authors, with the exception of Bewick, have mistaken Linnæus's bird, and that the *Lesser Pettychaps* (a name badly substituted for *Lesser Willow-Wren*) has no claim whatever to be considered as the *Motacilla Hippolais*, for which Linnæus refers to the *Pettychaps* of Ray, whose description exactly agrees with the *Greater Pettychaps*. Some parts, however, of Linnæus's description seem at variance with Ray's; but they may easily be reconciled." In the year 1819 Mr. Sheppard shot

shot a *Greater Pettychaps*, the legs of which were tinged with flesh-colour; and if Linnæus described from such a specimen when stuffed and dried, he would unquestionably describe the legs as dark brown or fuscous. Mr. Sheppard upon the whole is satisfied that "the *Greater Pettychaps* is the *Motacilla Hippolais* of Linnæus, or *Sylvia Hippolais* of modern authors;" and he proposes that the *Lesser Pettychaps* or *Lesser Willow-Wren* should be named "*Sylvia achetella*, from its every now and then, while the female is sitting, shivering its wings, and finishing its song with a cry very similar to the noise made by some species of crickets."

The following Observations by the Rev. Revett Sheppard were also read, viz.

"*Esox lucius*. No author that I know of has noticed the migration of Pikes, such as takes place yearly in spring in the Cam, up which river they come in great shoals, doubtless from the fens in the neighbourhood of Ely, where they are bred.

"*Cyprinus Brama*. There exist in the river Trent, in the neighbourhood of Newark, two species or varieties of Bream. The common one, *Cyprinus Brama*, is known there by the name of Carp Bream, from its yellow colour, and has been taken of nearly 8lbs. weight. The other species or variety, which I believe to be nondescript, never exceeds a pound in weight. It is of a silvery hue, and goes by the name of White Bream.

"*Talpa europæa*. A variety of the Mole is occasionally found at Levington, in the county of Suffolk. The snout is white, and a white line extends from the

middle of it as far upon the head as on a level with the eyes. Belly orange-tawny, which colour reaches to the breast, where it becomes narrow, and then forms a line across it reaching to the insertion of the fore feet. Tail covered thinly with long white hair, and the extreme half of it entirely white."

Dec. 21. Read a Letter from Mr. John Youell, of Yarmouth, A.L.S., addressed to the Secretary, in which he states, that on the 24th of May last, *Ardea Cayennensis*, Linn. was taken near the walls of that town. It has six crest-feathers of unequal length, and agrees with Linnæus's description of that species in all respects.

Mr. Youell also states, that a pair of the Green Ibis, *Tantalus viridis* Gmel., were taken near Yarmouth in October last.

Having remarked that Bewick, in describing the Coot, *Fulica atra* Linn., says that "it is a bad traveller, and may be said not to walk, but to splash and waddle between one pool and another with a laboured, ill-balanced, and awkward gait,"—Mr. Youell observes, that "this excellent author could have had but few opportunities of noticing the habits of this bird; for instead of being awkward on land, it is fully as lively on land as in the water, standing firmly and steadily, and without any tottering or waddling in its gait. It picks up grain with surprising alacrity; even much quicker than any of our domestic poultry. If deprived of water in which to pass the night, it will roost, as other land-birds, upon any elevated situation, and it will ascend a tree with the activity of the wren."

May

May 3, 1825. The Secretary reported that the following Members have subscribed to defray the expense of a Bust of Sir James Edward Smith, the President and Institutor of this Society, to be executed by F. Chantry, Esq. R.A., and to be placed in the Meeting-Room.

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Continued from Page 632 of Vol. XIII. of the Society's Transactions.

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